

Ready?

1. Suppose  $a, b, c$  are positive integers such that  $a \cdot b \cdot c = 36$ .  
What is the largest possible value of  $a + b + c$ ?

2. Each day, Jenny ate 20% of the jellybeans that were in her jar at the beginning of that day. At the end of the second day, 32 jellybeans remained in her jar. How many jellybeans were in the jar originally?

3. Which one of the ten digits  $0, \dots, 9$  is the last to appear in the units position of a number in the Fibonacci sequence?

$1, 1, 2, 3, 5, \dots$

4. How many positive integers  $b$  have the property that  $\log_b 64$  is a positive integer?

5. Today, December 7th, is a Sunday. What day of the week will December 7th occur on next year?

6. The mean of two positive integers is twice their product. What is their sum?

7. Suppose  $f$  is a function satisfying  $f(xy) = f(x) + f(y)$  for all positive integers  $x$  and  $y$ . What is  $f(1)$ ?

8. A box contains exactly five chips, three red and two white. Chips are randomly removed one at a time without replacement. What is the probability the last chip drawn is white?

9. How many positive integers less than 1001 are multiples of 2 or 5?

10. Suppose  $f$  is a function satisfying  $f(xy) = f(x) + f(y)$  for all positive integers  $x$  and  $y$ . Let  $f(2) = 2$ . What is  $f(16)$ ?

11. What is the area of the equilateral triangle with side length 1?

12. What is the sum of the solutions of

$$x^3 - 6x^2 + 11x - 6 = 0?$$

13. Cindy was asked by her teacher to subtract 3 from a certain number and then divide the result by 9. Instead, she subtracted 9 and then divided the result by 3, giving an answer of 43. What would her answer have been had she worked the problem correctly?

14. Find the degree measure of an angle whose complement is 25% of its supplement.

15. Seven circular cookies of radius 2 are placed on the bottom of a circular container and just manage to fit inside. What is the area of the bottom of the large container?

16. A glass of whole milk (3.25% fat) is mixed with half a glass of low fat milk (1% fat). What is the fat content of the resulting mixture, expressed as a percentage?

17. A real number plus its reciprocal equals 2. What is the number?

18. Let  $C_1$  be a circle centered at  $(0, 0)$  with radius 1, and let  $C_2$  be a circle centered at  $(3, 4)$  with radius 2. What is the least distance between a point on  $C_1$  and a point on  $C_2$ ?

19. For how many positive integers  $n$  is  $n^2 - 3n + 2$  a prime number?

20. How many different integers can be expressed as the sum of three distinct members of the set

$$\{1, 3, 4, 5, 8\}?$$

21. Four distinct circles are drawn in a plane. What is the maximum number of points where at least two of the circles intersect?

22. What is the difference between the sum of the first 2014 even positive integers and the sum of the first 2014 odd positive integers?

23. It takes Mary 30 minutes to walk uphill 1 km from her home to school, but it takes her only 10 minutes to walk from school to home along the same route. What is her average speed, in km/hr, for the round trip?

24. Let A and B be unknown digits from 0 - 9. The sum of the two 3-digit numbers A5B and 1BA is 541. What is  $A + B$ ?

25. Al, Bert, and Carl are the winners of a school drawing for a pile of Halloween candy, which they are to divide in a ratio of

3 : 2 : 1.

Due to some confusion, they come at different times to claim their prizes, and each assumes he is the first to arrive. (They arrive in the order Al, Bert, then Carl.) If each takes what he believes to be his correct share of candy, what fraction of the candy goes unclaimed?

26. Express the repeating decimal

$0.121212\dots$

as a fraction.

27. How many non-congruent triangles with perimeter 7 have integer side lengths?

28. What is the units digit of  $7^{343}$ ?

29. A point  $P$  is chosen at random in the interior of equilateral triangle  $ABC$ . What is the probability that  $\triangle ABP$  has a greater area than each of  $\triangle ACP$  and  $\triangle BCP$ ?

30. How many possible distinct rearrangements of the word  
ANAGRAM are there?

31. Let  $f$  be a linear function for which  $f(6) - f(2) = 12$ . What is  $f(12) - f(2)$ ?

32. If  $\log(xy^3) = 1$  and  $\log(x^2y) = 1$ , what is  $\log(xy)$ ?