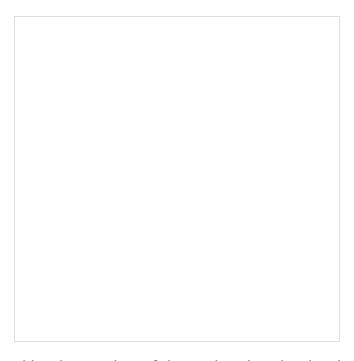
# **Project Euler #109: Darts**

This problem is a programming version of Problem 109 from projecteuler.net

In the game of darts a player throws three darts at a target board which is split into twenty equal sized sections numbered one to twenty.



The score of a dart is determined by the number of the region that the dart lands in. A dart landing outside the red/green outer ring scores zero. The black and cream regions inside this ring represent single scores. However, the red/green outer ring and middle ring score double and treble scores respectively.

At the centre of the board are two concentric circles called the bull region, or bulls-eye. The outer bull is worth \$25\$ points and the inner bull is a double, worth \$50\$ points.

There are many variations of rules but in the most popular game the players will begin with a score \$301\$ or \$501\$ and the first player to reduce their running total to zero is a winner. However, it is normal to play a "doubles out" system, which means that the player must land a double (including the double bulls-eye at the centre of the board) on their final dart to win; any other dart that would reduce their running total to one or lower means the score for that set of three darts is "bust".

When a player is able to finish on their current score it is called a "checkout" and the highest checkout is \$\text{170: T20 T20 D25}\$ (two treble 20s and double bull).

There are exactly 14 distinct ways to checkout on a score of \$6\$:

 $$\$ \left( \frac{1}{8} - \frac{1}{8} \right) \le - \frac{1}{8} - \frac{1}{8} = \frac{1}{8}$ 

Note that D1 D2 is considered **different** to D1 as they finish on different doubles. Moreover, the combination D1 is also considered **different** to D1.

In addition we shall not include misses in considering combinations; for example, D3 is the **same** as D3 and D3.

Now imagine you have an infinite number of darts. Now you can stop on every double you get. How many ways you have to checkout with score \$\leq N\$?

## **Input Format**

A single natural number  $N \leq 2^{60}$  - maximum score you need to investigate.

## **Output Format**

The only number -\$ the answer to the problem modulo  $10^9+9$ .

## **Sample Input**

4

# **Sample Output**

6

## **Explanation**

There are six ways:

1) D1: score=2

2) S1 D1: score=3

3) D2: score=4

4) D1 D1: score=4

5) S2 D1: score=4

6) S1 S1 D1: score=4