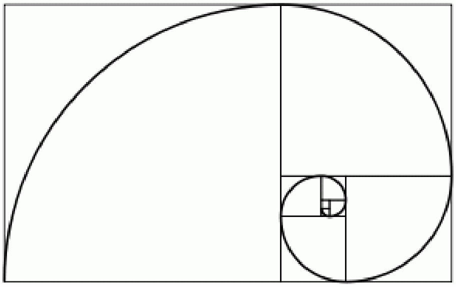

I suppose everyone here has heard of the famous **golden ratio** $\varphi = \frac{1+\sqrt{5}}{2} \approx 1.618$. This number possesses numerous interesting properties, one of which is illustrated by the following brain-teaser:

> *"What is the 200th significant digit of φ^{600} (φ to the 600th power)?"*

The answer is 9. This is because $\varphi^n + (1-\varphi)^n$ is an integer for any positive integer n, and $(1-\varphi)^{600}$ is an extremely small positive number.

In this problem we introduce two more "metal ratios": the **silver ratio** $\frac{2+\sqrt{8}}{2} \approx 2.414$ and the **bronze ratio** $\frac{3+\sqrt{13}}{2} \approx 3.303$. (These terms are certainly not made up by us; try searching "silver ratio" in MathWorld and you'll see the numbers. Oh wait, Bronze is NOT a metal, hmm...) Curiously, each of these three ratios, when raised to the n-th power (for n large enough), is very close to an integer. (Perhaps it is not that curious for those who know *difference equations*.) Let us call these approximate integers "the Metal Powers". Your job is to **write a program** that computes them.

Input

Input has no more than 250 lines, each containing a value of n ($0 \le n \le 100000000$) followed by one of the uppercase letters '`G`' (for "Golden"), '`S`' (for "Silver") or '`B`' (for "Bronze").

Output

For each case, your program should give the corresponding "Metal Power". (For example, the 600th Golden Power means the closest integer to φ^{600}.) If any result contains **more than nine digits**, you only need to give its first three and last three significant digits, together with its total number of digits, as shown in the sample output. You must use the suffixes '`th`', '`st`', '`nd`' and '`rd`' appropriately.

Explanation: The exact value for the third sample case is:

```
102266868132036
```

Sample Input

```
0 G
2 S
27 B
```

Sample Output

```
The 0th Golden Power is 1.
The 2nd Silver Power is 6.
The 27th Bronze Power is 102...036(15 digits).
```