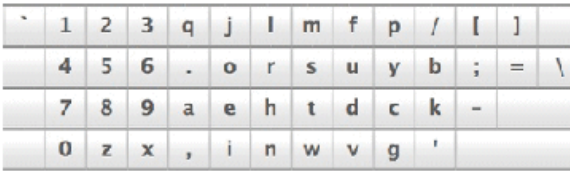
After spending several weeks typing using the right-handed Dvorak keyboard layout, the coach (introduced in the previous problem) started to wonder if it really is any better. He decided to devise a method to verify this.

The coach would like to compare typing on the right-handed Dvorak keyboard against using a QWERTY keyboard with two hands and with one hand. A crude, but effective way to compare keyboard layouts is to measure the total distance the typing fingers must travel in order to type a certain passage of text. Can you write a program to help the coach perform this experiment?

The distance travelled by a finger will be measured from the centre of its home key to the centre of the target key and back. In order to simplify the computations, we pretend that every key is a perfect square with unit length sides, and that all keys are laid out on a perfect grid (even though in reality they are usually staggered). The diagrams below show the straightened keyboards; see the previous problem for shift-modified diagrams.



The QWERTY and right!handed Dvorak keyboard layouts arranged on perfect grids.

On the QWERTY keyboard, the home keys are "ASDFJKL;" for two hands and "FGHJ" for one hand. On the Dvorak keyboard, the home keys are "EHTD". A key is always struck by the finger from the nearest home key.

For example, the distances for 'S' would be 0, 4, and 2 for the two-hand QWERTY, one-hand QWERTY, and Dvorak keyboards, respectively. Likewise, the distances for 'C' would be 2, 2.828427..., and 2, respectively.

Given a line of text, your task is to compute the total distance travelled by the typing fingers in typing that text, first using the QWERTY keyboard with two hands, then with one hand, and finally using the right-handed Dvorak keyboard. You can neglect any distance travelled in typing spaces or shifting.

Input

The input file consists of several lines of text. Each line contains no more than 1000 alpha-numeric characters, spaces, and punctuation found on the keyboard.

Output

For each line of input, your program should write a line containing three real numbers accurate to 2 decimal places, representing the total distances travelled by the typing fingers. The first number corresponds to using the QWERTY layout with two hands, the second to one-handed QWERTY, and the third to right-handed Dvorak.

Sample Input

```
CCPC
Which keyboard is better?
Numbers! 1234567890
```

Sample Output

```
8.00 14.81 10.47
40.14 60.24 39.43
58.60 74.72 92.52
```