

Problem 6—Expanding Password

Professor Plum has a hard time remembering passwords, so he has used the same password 9P8L7U6M@52 forever. The IT department has warned him that they are going to require much longer passwords on the Monday after MICS, but they have not told him the minimum length yet. Professor Plum wants to be prepared and possibly help others in the same situation. He wants you to write a program to lengthen any password containing decimal digits (0 to 9) by converting each decimal digit to a lower base. For example his password 9P8L7U6M@52 with each decimal digit converted to base-2 (i.e., binary) would give the longest password of 1001P1000L111U110M@10110.

Since 24-digits might be longer than the IT department's new password length, he wants to use the **largest** base necessary to meet the new IT specified password length. If the password cannot be lengthened enough, then the base-2 conversion will be used with a suffix of enough '@' characters to reach the desired length. For example his password 9P8L7U6M@52 expanded to length 30 would be 1001P1000L111U110M@10110@@@@@.

Input Format

The input consists of multiple lines with each containing a password-length pair separated by a space.

Output Format

For each password-length pair in the input, a single line of output should be produced. Each output line should be formatted as shown below.

Input Sample

```
9P8L7U6M@52 8
9P8L7U6M@52 13
9P8L7U6M@52 20
9P8L7U6M@52 30
9P8L7U6M@52 16
=MiCs2015 10
Cat 5
```

Output Sample

```
Old password 9P8L7U6M@52 expanded to length 8 is 9P8L7U6M@52
Old password 9P8L7U6M@52 expanded to length 13 is 11P10L7U6M@52
Old password 9P8L7U6M@52 expanded to length 20 is 1001P1000L111U110M@10110
Old password 9P8L7U6M@52 expanded to length 30 is 1001P1000L111U110M@10110@@@@@
Old password 9P8L7U6M@52 expanded to length 16 is 14P13L12U11M@102
Old password =MiCs2015 expanded to length 10 is =MiCs20110
Old password Cat expanded to length 5 is Cat@@
```