

3947 Mirrored palindromes

As you may know, a *palindrome* is a word (or string) that is the same both forwards and backwards. For example, “MADAM” is a palindrome as it is the same when read left-to-right or right-to-left.

However, another form of the palindrome is a *mirrored string*. As some characters are mirrors of themselves (such as A or T) and some characters can be mirrored using other letters or numbers (such as E and 3 — not perfectly mind you, but still a mirror). An example is “AEIUI3A”.

Combining the two (palindrome and mirrored string) one gets and *mirrored palindrome*. This is essentially the combination of the two, i.e. it can be read the same both forward and backward and it is an exact mirror of itself.

An example of this could be “MOTOM”, as M, O (letter, not zero) and T are all their own mirrored characters.

Here is a list of all characters that have mirrors:

```
A -> A
E -> 3
H -> H
I -> I
J -> L
L -> J
M -> M
O -> O
S -> 2
T -> T
U -> U
V -> V
W -> W
X -> X
Y -> Y
Z -> 5
1 -> 1
2 -> S
3 -> E
5 -> Z
8 -> 8
```

Characters that do not have a mirror are: B, C, D, F, G, K, N, P, Q, R, 4, 6, 7 and 9.

As 0 (zero) and O (letter O) are too similar, 0 (zero) will be excluded.

There are other character mirrors, but only the above ones will be used.

Input

The input consists of an unknown number of strings, each on a new line, that need to be classified. Only the following characters will be present: ‘A..Z’ and ‘1..9’.

Output

The output must display one of the following for each line of input:

- **neither** — if the string is neither a palindrome nor a mirrored string
- **palindrome** — if the string is a palindrome, but not a mirrored string
- **mirrored** — if the string is a mirrored string, but not a palindrome
- **both** — if the string is both a palindrome and a mirrored string.

Sample Input

```
TOTEM  
MADAM  
AEIUI3A  
MOTOM
```

Sample Output

```
neither  
palindrome  
mirrored  
both
```