Interpreter

A certain computer has ten registers and 1,000 words of RAM. Each register or RAM location holds a three-digit integer between 0 and 999. Instructions are encoded as three-digit integers and stored in RAM. The encodings are as follows:

|  |  |
| --- | --- |
| 100 | Means *halt* |
| 2*dn* | Means *set register d to n (between 0 and 9)* |
| 3*dn* | Means *add n to register d* |
| 4*dn* | Means *multiply register d by n* |
| 5*ds* | Means *set register d to the value of register s* |
| 6*ds* | Means *add the value of register s to register d* |
| 7*ds* | Means *multiply the value of register d by the value of register s* |
| 8*da* | Means *set register d to the value in RAM whose address is in register a* |
| 9*sa* | Means *set the value in RAM whose address is in register a to that of register s* |
| 0*ds* | Means *goto the location in register d unless register s contains 0* |

All registers initially contain 000. The initial content of RAM is read from standard input. The first instruction to be executed is at RAM address 0. All results are reduced modulo 1,000.

*Input*

The input begins with a single positive integer on a line by itself indicating the number of cases, each described as below. This is followed by a blank line, and there will be a blank line between each two consecutive inputs.

Each input case consists of up to 1,000 three-digit unsigned integers, representing the contents of consecutive RAM locations starting at 0. Unspecified RAM locations are initialized to 000.

*Output*

The output of each test case is a single integer: the number of instructions executed up to and including the halt instruction. You may assume that the program does halt. Separate the output of two consecutive cases by a blank line.

*Sample Input*

1

299

492

495

399

492

495

399

283

279

689

078

100

000

000

000

*Sample Output*

16

***PROOF***

*All instructions are loaded into RAM*:

000: 299

001: 492

002: 495

003: 399

004: 492

005: 495

006: 399

007: 283

008: 279

009: 689

010: 078

011: 100

012: 000

013: 000

014: 000

*Instruction counter*:

1. 000 **299** R9 = 9
2. 001 **492** R9 = R9 x 2 = 9 x 2 = 18
3. 002 **495** R9 = R9 x 5 = 18 x 5 = 90
4. 003 **399** R9 = R9 + 9 = 99 + 9 = 99
5. 004 **492** R9 = R9 x 2 = 99 x 2 = 198
6. 005 **495** R9 = R9 x 5 = 198 x 5 = 990
7. 006 **399** R9 = R9 + 9 = 990 + 9 = 999
8. 007 **283** R8 = 3
9. 008 **279** R7 = 9
10. 009 **689** R8 = R8 + R9 = 3 + 999 = 1002 = 2 [modulo 1000]
11. 010 **078** IF R8 != 0 GOTO MR7 [R8 = 3, R7 = 9, 009 = 689]
12. 009 **689** R8 = R8 + R9 = 2 + 999 = 1001 = 1 [modulo 1000]
13. 010 **078** IF R8 != 0 GOTO MR7 [R8 = 2, R7 = 9, 009 = 689]
14. 009 **689** R8 = R8 + R9 = 1 + 999 = 1000 = 0 [modulo 1000]
15. 010 **078** IF R8 != 0 GOTO MR7 [R8 = 0]
16. 011 **100** HALT