

G - Mordred's Treasure

The evil Mordred has hidden some treasures in the catacombs of his castle. You must use your coding skills to search the tunnels and locate one of the treasures in the least possible time before the castle crumbles and buries all the treasure forever. You will rappel into the catacombs from above, and once inside, travel horizontally through tunnels until you locate a treasure. A friend inside the castle has arranged to give you a text file containing a map, which will be used by your computer program to do the searching. Your program must go through the open tunnels to get to the nearest treasure. All treasures have equal value, so it doesn't matter which treasure you find.

Input

The first line of input indicates the number of test cases. Each test case that follows begins with two integers R and C separated by a space on a line by themselves, specifying the number of rows and columns in a rectangular map ($1 \leq R, C \leq 50$). The remaining lines consist of the map itself: the letter S marks a single starting point, X is part of a wall, a space is an open tunnel, and each letter T shows the location of a treasure. Every edge of a map is bounded by an invisible wall. Some tunnels lead to dead ends, and others lead to treasures.

Output

If a treasure can be reached, print out a message indicating the shortest number of steps required to reach any treasure from the starting point. Otherwise, print -1 .

Sample Input

```
2
5 7
XXXXXTX
XTX  XX
XXX X X
X  S  X
XXXXXXX
8 11
XXSXXXXXXXXX
XX      XXXX
XX XXX TXXX
XX XXX XXXX
XX XXX XXXX
TX      XXTX
XXXX X    X
XXXXXXXXXXXX
```

Sample Output

```
-1
7
```