

# Ore Mining (800 points)

## Introduction

A mining operation has discovered deposits of  $N$  different kinds of liquid ore, which they have labeled  $n_i$  for  $0 \leq i < N$ . The deposits are spread throughout  $M$  sheets of rock, which have been labeled  $m_j$  for  $0 \leq j < M$ .

To simplify the problem, let us imagine we are looking at a cross section of the rock which has been divided into  $N$  columns and  $M$  rows, for a total of  $N \cdot M$  cells. Each type of ore  $n_i$  appears exactly once in each sheet of rock  $m_j$  (i.e. once per row).

The crew needs to drill paths from the top layer  $m_0$  to the bottom layer  $m_{M-1}$  such that each path connects deposits of one type of ore  $n_i$  across all  $M$  layers.

In the example below with  $N=6$  and  $M=5$ , you can see the best option is to drill 4 paths, for ores  $n_1$ ,  $n_2$ ,  $n_3$ , and  $n_5$ .

$m_0$	$n_0$	$n_1$	$n_2$	$n_3$	$n_4$	$n_5$
$m_1$	$n_1$	$n_0$	$n_2$	$n_3$	$n_4$	$n_5$
$m_2$	$n_0$	$n_1$	$n_2$	$n_3$	$n_4$	$n_5$
$m_3$	$n_0$	$n_1$	$n_2$	$n_4$	$n_3$	$n_5$
$m_4$	$n_1$	$n_2$	$n_0$	$n_3$	$n_5$	$n_4$

Let us define a valid path for ore  $n_i$  as  $M-1$  line segments, each of which connects a deposit of ore  $n_i$  in layer  $m_j$  to the deposit of ore  $n_i$  in layer  $m_{j+1}$ , such that no line segment intersects the line segment of another path. There should be no more than 1 path per type of ore.

What is the **maximum number of valid paths** that can be drilled by the above definition?

## Input Specifications

The first line will contain two space-separated integers,  $N$  and  $M$ , where  $1 \leq N < 1000$  and  $2 \leq M < 1000$ .

The next M lines will contain N space-separated, case-sensitive names of ore types (all names are 20 alphabetic characters or fewer). The same N names will appear on each line, although possibly not necessarily in the same order.

## Output Specifications

The maximum number of paths which can be drilled and considered valid by the above criteria.

## Sample Input/Output

### Input

```
3 2
A B C
A C B
```

### Output

```
2
```

### Explanation

Here we have two ways to drill 2 paths: {A, B} or {A, C}.

---

### Input

```
3 2
Alpha Beta Gamma
Alpha Beta Gamma
```

### Output

```
3
```

### Explanation

Here we have one way to drill 3 paths: {Alpha, Beta, Gamma}.

---

### Input

```
3 3
A B C
B C A
C A B
```

### Output

```
1
```

### Explanation

Here we have three ways to drill 1 path: {A} or {B} or {C}.

---

### Input

5 3  
A B C D E  
A C E B D  
A B D C E

### Output

3

### Explanation

Here we have two ways to drill 3 paths: {A, B, D} or {A, C, E}.