Advent of Code   [About] [AoC++] [Events] [Settings] [Log Out]   Roland Tritsch (AoC++) 21*
    var y=2017;   [Calendar] [Leaderboard] [Stats] [Sponsors]
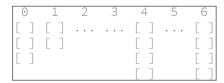
--- Day 13: Packet Scanners ---

You need to cross a vast firewall. The firewall consists of several layers,
each with a security scanner that moves back and forth across the layer. To
succeed, you must not be detected by a scanner.

By studying the firewall briefly, you are able to record (in your puzzle
input) the depth of each layer and the range of the scanning area for the
scanner within it, written as depth: range. Each layer has a thickness of
exactly 1. A layer at depth 0 begins immediately inside the firewall; a
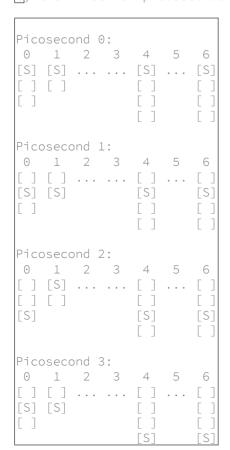layer at depth 1 would start immediately after that.

For example, suppose you've recorded the following:

```
0: 3
1: 2
4: 4
6: 4
```

This means that there is a layer immediately inside the firewall (with
range 3), a second layer immediately after that (with range 2), a third
layer which begins at depth 4 (with range 4), and a fourth layer which
begins at depth 6 (also with range 4). Visually, it might look like this:

```
 0   1   2   3   4   5   6
[ ] [ ] ... ... [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[ ]             [ ]     [ ]
                [ ]     [ ]
```

Within each layer, a security scanner moves back and forth within its
range. Each security scanner starts at the top and moves down until it
reaches the bottom, then moves up until it reaches the top, and repeats. A
security scanner takes one picosecond to move one step. Drawing scanners as
S, the first few picoseconds look like this:

```
Picosecond 0:
 0   1   2   3   4   5   6
[S] [S] ... ... [S] ... [S]
[ ] [ ]         [ ]     [ ]
[ ]             [ ]     [ ]
                [ ]     [ ]

Picosecond 1:
 0   1   2   3   4   5   6
[ ] [ ] ... ... [ ] ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]

Picosecond 2:
 0   1   2   3   4   5   6
[ ] [S] ... ... [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[S]             [S]     [S]
                [ ]     [ ]

Picosecond 3:
 0   1   2   3   4   5   6
[ ] [ ] ... ... [ ] ... [ ]
[S] [S]         [ ]     [ ]
[ ]             [ ]     [ ]
                [S]     [S]
```

Your plan is to hitch a ride on a packet about to move through the
firewall. The packet will travel along the top of each layer, and it moves
at one layer per picosecond. Each picosecond, the packet moves one layer
forward (its first move takes it into layer 0), and then the scanners move
one step. If there is a scanner at the top of the layer as your packet
enters it, you are caught. (If a scanner moves into the top of its layer
while you are there, you are not caught: it doesn't have time to notice you
before you leave.) If you were to do this in the configuration above,
marking your current position with parentheses, your passage through the
firewall would look like this:

```
Initial state:
 0   1   2   3   4   5   6
[S] [S] ... ... [S] ... [S]
[ ] [ ]         [ ]     [ ]
[ ]             [ ]     [ ]
                [ ]     [ ]

Picosecond 0:
 0   1   2   3   4   5   6
(S) [S] ... ... [S] ... [S]
[ ] [ ]         [ ]     [ ]
[ ]             [ ]     [ ]
                [ ]     [ ]

 0   1   2   3   4   5   6
( ) [ ] ... ... [ ] ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]


Picosecond 1:
 0   1   2   3   4   5   6
[ ] ( ) ... ... [ ] ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]

 0   1   2   3   4   5   6
[ ] (S) ... ... [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[S]             [S]     [S]
                [ ]     [ ]


Picosecond 2:
 0   1   2   3   4   5   6
[ ] [S] (.) ... [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[S]             [S]     [S]
                [ ]     [ ]

 0   1   2   3   4   5   6
[ ] [ ] (.) ... [ ] ... [ ]
[S] [S]         [ ]     [ ]
[ ]             [ ]     [ ]
                [S]     [S]


Picosecond 3:
 0   1   2   3   4   5   6
[ ] [ ] ... (.) [ ] ... [ ]
[S] [S]         [ ]     [ ]
[ ]             [ ]     [ ]
                [S]     [S]

 0   1   2   3   4   5   6
[S] [S]         ( ) [ ]
```

```
[S] [S] ... (.) [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[ ]             [S]     [S]
                [ ]     [ ]


Picosecond 4:
 0   1   2   3   4   5   6
[S] [S] ... ... ( ) ... [ ]
[ ] [ ]         [ ]     [ ]
[ ]             [S]     [S]
                [ ]     [ ]


 0   1   2   3   4   5   6
[ ] [ ] ... ... ( ) ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]


Picosecond 5:
 0   1   2   3   4   5   6
[ ] [ ] ... ... [ ] (.) [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]


 0   1   2   3   4   5   6
[ ] [S] ... ... [S] (.) [S]
[ ] [ ]         [ ]     [ ]
[S]             [ ]     [ ]
                [ ]     [ ]


Picosecond 6:
 0   1   2   3   4   5   6
[ ] [S] ... ... [S] ... (S)
[ ] [ ]         [ ]     [ ]
[S]             [ ]     [ ]
                [ ]     [ ]


 0   1   2   3   4   5   6
[ ] [ ] ... ... [ ] ... ( )
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]
```

In this situation, you are caught in layers 0 and 6, because your packet
entered the layer when its scanner was at the top when you entered it. You
are not caught in layer 1, since the scanner moved into the top of the
layer once you were already there.

The severity of getting caught on a layer is equal to its depth multiplied
by its range. (Ignore layers in which you do not get caught.) The severity
of the whole trip is the sum of these values. In the example above, the
trip severity is 0*3 + 6*4 = 24.

Given the details of the firewall you've recorded, if you leave
immediately, what is the severity of your whole trip?

Your puzzle answer was 1632.

The first half of this puzzle is complete! It provides one gold star: *

--- Part Two ---

Now, you need to pass through the firewall without being caught - easier
said than done.

You can't control the speed of the packet, but you can delay it any number
of picoseconds. For each picosecond you delay the packet before beginning
your trip, all security scanners move one step. You're not in the firewall
during this time; you don't enter layer 0 until you stop delaying the
packet.

In the example above, if you delay 10 picoseconds (picoseconds 0 - 9), you
won't get caught:

```
State after delaying:
 0   1   2   3   4   5   6
[ ] [S] ... ... [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[S]             [S]     [S]
                [ ]     [ ]


Picosecond 10:
 0   1   2   3   4   5   6
( ) [S] ... ... [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[S]             [S]     [S]
                [ ]     [ ]


 0   1   2   3   4   5   6
( ) [ ] ... ... [ ] ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]



Picosecond 11:
 0   1   2   3   4   5   6
[ ] ( ) ... ... [ ] ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]


 0   1   2   3   4   5   6
[S] (S) ... ... [S] ... [S]
[ ] [ ]         [ ]     [ ]
[ ]             [ ]     [ ]
                [ ]     [ ]



Picosecond 12:
 0   1   2   3   4   5   6
[S] [S] (.) ... [S] ... [S]
[ ] [ ]         [ ]     [ ]
[ ]             [ ]     [ ]
                [ ]     [ ]


 0   1   2   3   4   5   6
[ ] [ ] (.) ... [ ] ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]



Picosecond 13:
 0   1   2   3   4   5   6
[ ] [ ] ... (.) [ ] ... [ ]
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]


 0   1   2   3   4   5   6
[ ] [S] ... (.) [ ] ... [ ]
[ ] [ ]         [ ]     [ ]
[S]             [S]     [S]
```

```
[S]         [S]     [S]
            [ ]     [ ]


Picosecond 14:
 0   1   2   3   4   5   6
[ ] [S] ... ... ( ) ... [ ]
[ ] [ ]         [ ]     [ ]
[S]             [S]     [S]
                [ ]     [ ]

 0   1   2   3   4   5   6
[ ] [ ] ... ... ( ) ... [ ]
[S] [S]         [ ]     [ ]
[ ]             [ ]     [ ]
                [S]     [S]


Picosecond 15:
 0   1   2   3   4   5   6
[ ] [ ] ... ... [ ] (.) [ ]
[S] [S]         [ ]     [ ]
[ ]             [ ]     [ ]
                [S]     [S]

 0   1   2   3   4   5   6
[S] [S] ... ... [ ] (.) [ ]
[ ] [ ]         [ ]     [ ]
[ ]             [S]     [S]
                [ ]     [ ]


Picosecond 16:
 0   1   2   3   4   5   6
[S] [S] ... ... [ ] ... ( )
[ ] [ ]         [ ]     [ ]
[ ]             [S]     [S]
                [ ]     [ ]

 0   1   2   3   4   5   6
[ ] [ ] ... ... [ ] ... ( )
[S] [S]         [S]     [S]
[ ]             [ ]     [ ]
                [ ]     [ ]
```

Because all smaller delays would get you caught, the fewest number of
picoseconds you would need to delay to get through safely is 10.

What is the fewest number of picoseconds that you need to delay the packet
to pass through the firewall without being caught?

Although it hasn't changed, you can still get your puzzle input.

Answer: [   ] [Submit]

You can also [Share] this puzzle.