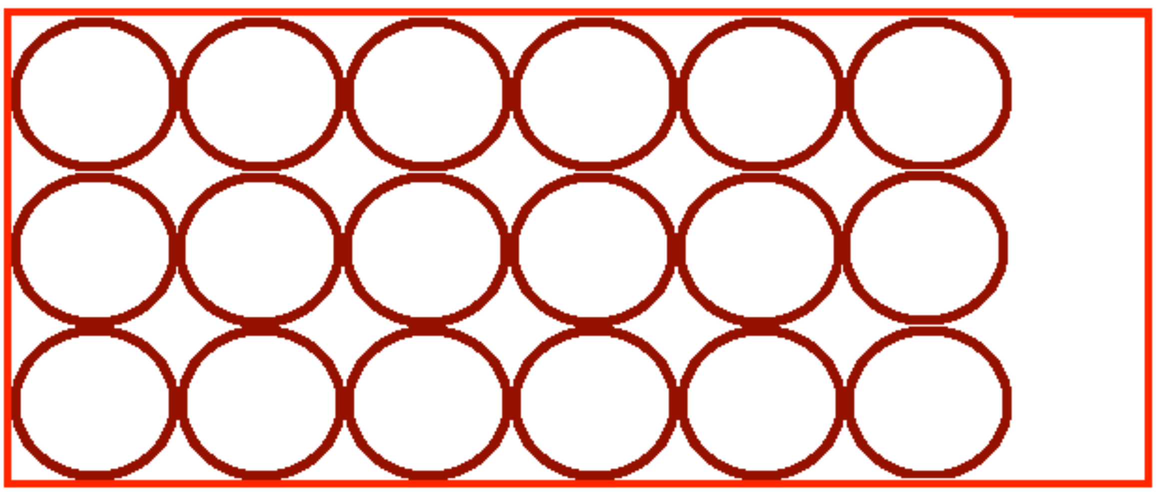
The assumptions I'll make about the problem are as followed:

1. The bridge is completely flat.
2. There are no obstructions on the bridge, such as poles, fire hydrants, and cars.
3. The pennies have to be placed on the bridge itself, and not on any accessories attached to it, like the towers or other supportive structures.
4. The pennies have to be whole and unaltered (i.e., I cannot cut them or melt them down)

Given the initial problem, I thought of the bridge as a long, rectangular box. This gives me the image that the pennies have to be contained within the constraints of the bridge's dimensions. Also, to further define my analogy, the pennies must be flat in the box to fulfill the same requirements.

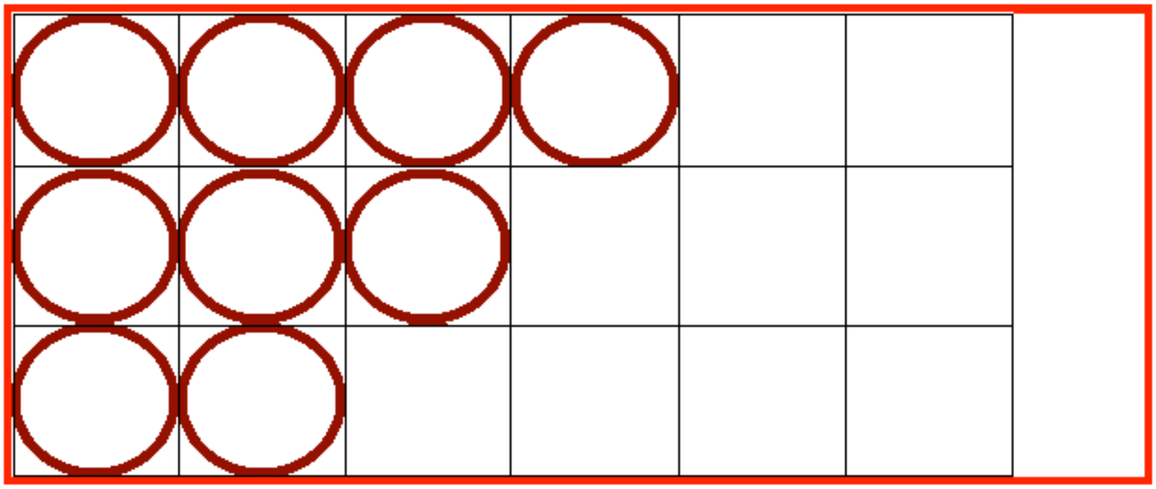
Initially, I'll line up the pennies on the bridge in rows and columns, from one end of the bridge to the other end.

The following crude picture should roughly depict the idea I have in mind.

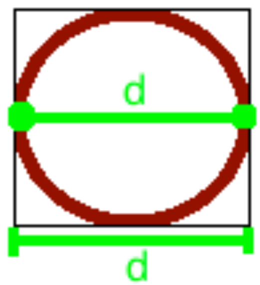


Looking at this setup, I notice that the pennies are stacked uniformly. To simplify the shapes (and my diagrams), we can change the pennies to become squares.

Although this does change the area of the pennies, it does not affect the number of pennies that will fit on the bridge.



After changing the penny to a square, we can easily figure out the square's dimensions: each side is the length of the penny's diameter.



Now that I've defined the building blocks of the problem, I'll move on to figuring out the solution.

Normally, I would take the area of the bridge and divide it by the area of the square.

Instead, I will count how many rows will be needed to cover the width of the bridge. Then I will count the number of pennies in each row to cover the length of the bridge. This will further ensure no pennies overlap near the borders of the bridge.

To figure the number of columns (i.e., the length of our tiled pennies), I will divide the bridge length by the penny length. The result is rounded down to the nearest integer so that we can measure the pennies that are *on* the bridge itself.

$$\frac{L}{d} = numberOfPenniesLong$$

To figure the number of rows (the width of the penny layout), I will divide the bridge width by the penny width (which conveniently is the same as the penny length). Just like the same constraint with the length, I'll round down to the nearest integer.

$$\frac{W}{d} = numberOfPenniesWide$$

Multiplying these two results should give us the number of pennies that can fit on the bridge.

$$(numberOfPenniesLong) \bullet (numberOfPenniesWide) = totalPennies$$

Now that I have my general ideas, I'll start plugging in numbers to get the actual numbers.

Based on sources, the length of the Golden Gate Bridge at 8,981 feet[1] (107,772 inches) and the width at 90 feet[1] (1,080 inches). Also, the diameter of a U.S. penny is noted to be at 0.750 inches[2].

Number of pennies long:

$$\frac{L}{d} = \frac{107{,}772in}{0.750in} = 143{,}696\,pennies$$

Number of pennies wide:

$$\frac{W}{d} = \frac{1{,}080in}{0.750in} = 1{,}440\,pennies$$

Total pennies:

$$(143{,}696) \bullet (1{,}440) = 206{,}922{,}240\,pennies$$

Unfortunately, a second look over my solution tells me that this is the minimal amount of pennies you can fit on the Golden Gate Bridge, not the most. To find a more optimal solution, a much more elegant methodology is required.

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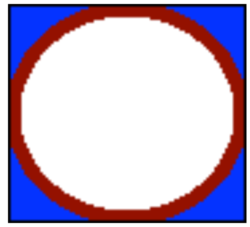
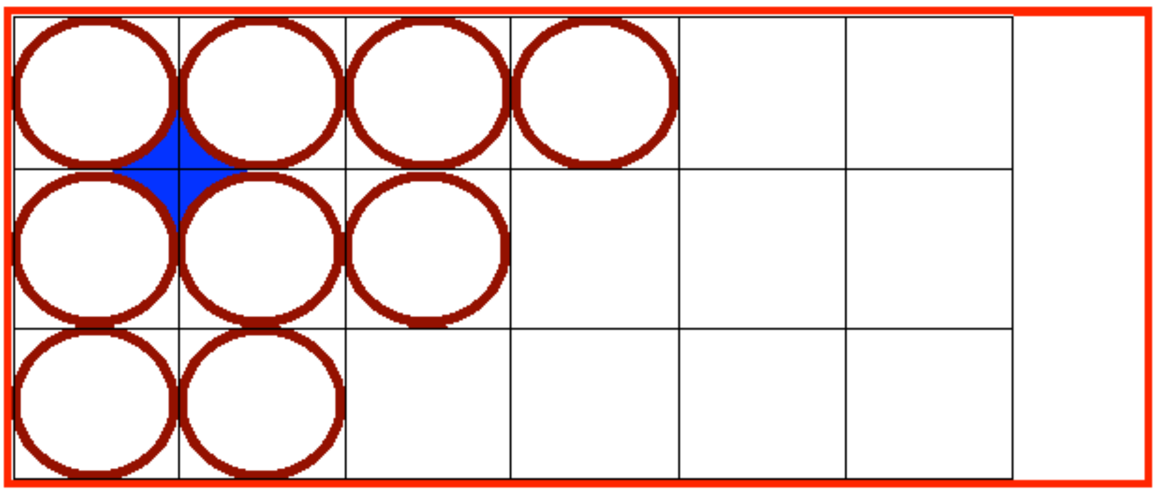
1 "Golden Gate Bridge Facts " – About.com California Travel
http://gocalifornia.about.com/cs/sanfrancisco/a/ggbridge_3.htm

2 "Coin Specifications" – The United States Mint
http://www.usmint.gov/about_the_mint/?action=coin_specifications

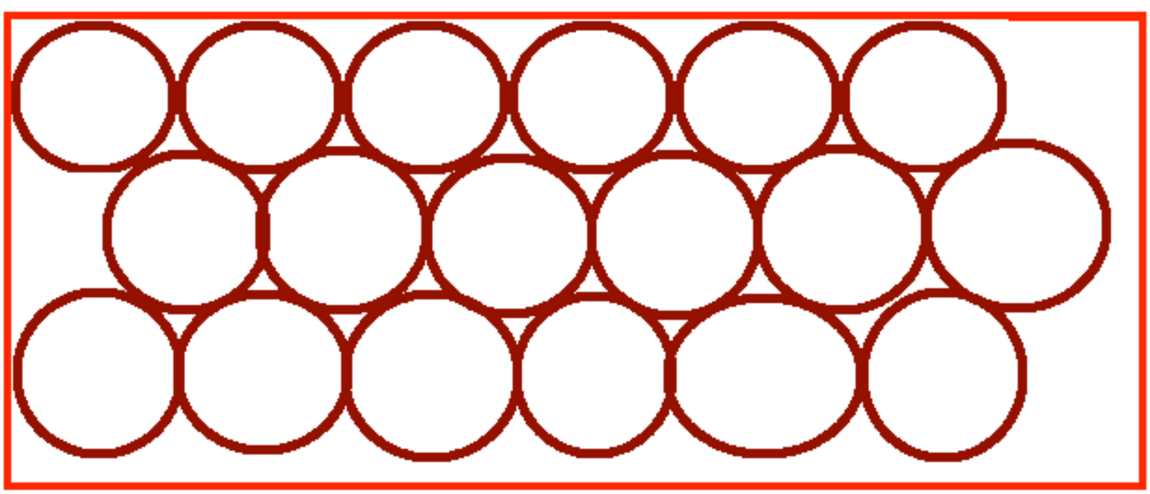
Looking back at my work, I noticed that changing the penny to a square left some areas unused. These areas are denoted in blue:



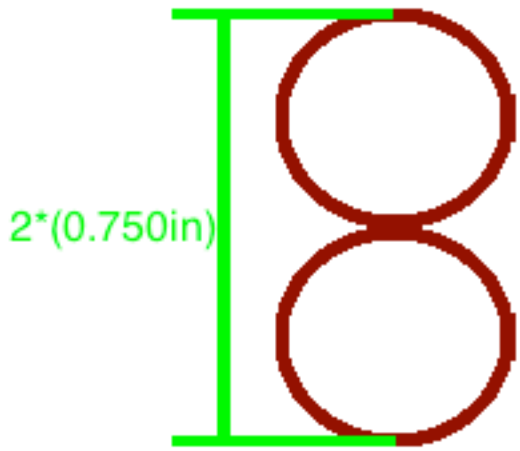
Although it doesn't seem too bad in the above picture, when you look at the entire bridge, these unused spaces can add up.



I can optimize my penny layout by laying each row of pennies offset from its neighboring rows. This will reduce the uncovered area between pennies and would yield a much better solution than my initial one.

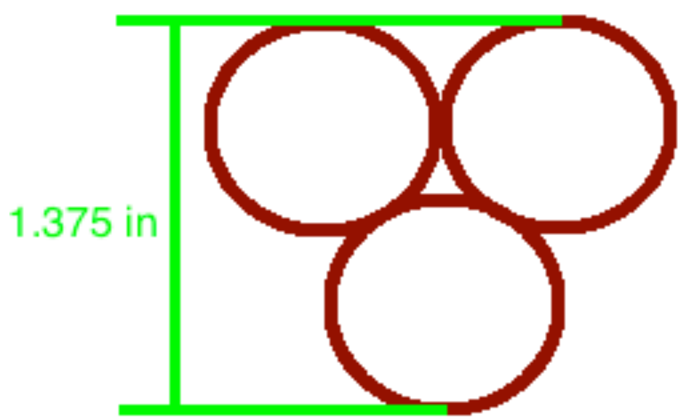


Because of the difference between the two layouts, the height of each additional row is also different.



$$(0.750in) + x \bullet (0.750in) = overalWidth$$

In this layout, the first penny gives us a row width of 0.750 inches (a penny's diameter), while any additional rows add on 0.750 inches per extra row ('x' is the number of additional rows).



$$(0.750in) + x \bullet (0.625in) = overalWidth$$

In this optimized layout, the first penny still gives us a row width of 0.750 inches. The difference is that the additional rows only take up 0.625 inches. Given enough extra space, we can add even more rows of pennies on the bridge and increase the total number of pennies.

For comparison, I'll substitute "overalWidth" with the Golden Gate Bridge's width and solve for 'x' in both equations.

Initial Layout:

$$(0.750in) + x \bullet (0.750in) = 1{,}080in$$
$$x \bullet (0.750in) = (1{,}080in - 0.750in)$$
$$x = \frac{(1{,}080in - 0.750in)}{0.750in} = 1{,}439\,pennies$$

Optimized Layout:

$$(0.750in) + x \bullet (0.625in) = 1{,}080in$$
$$x \bullet (0.625in) = (1{,}080in - 0.750in)$$
$$x = \frac{(1{,}080in - 0.750in)}{0.625in} = 1{,}726\,pennies$$

The optimized layout gives us an additional 287 rows of pennies over the initial layout.

Taking information from our previous calculations, we can update the amount of pennies we can fit on the bridge.

Number of pennies long:

$$\frac{L}{d} = \frac{107{,}772in}{0.750in} = 143{,}696\,pennies$$

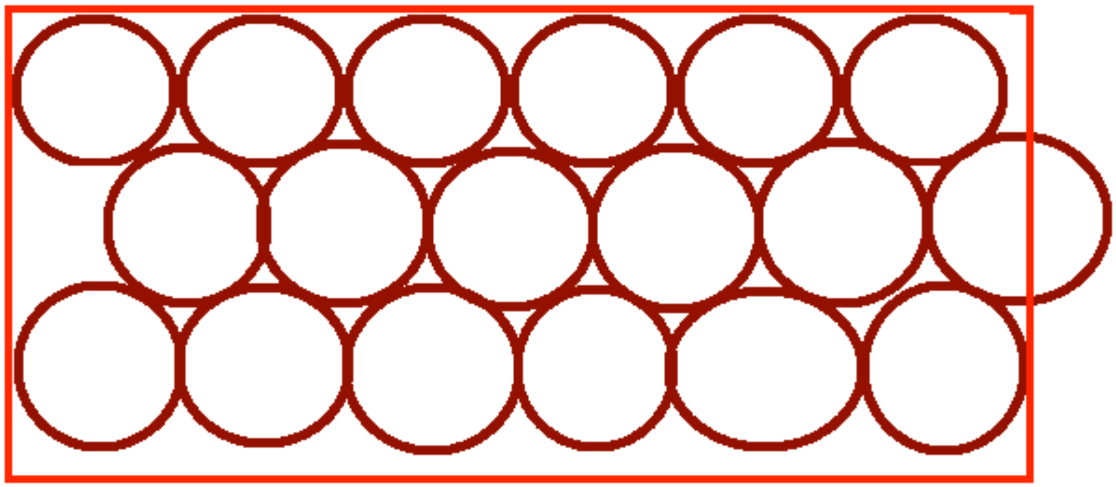
Number of pennies wide:

(1 penny, from the initial row) + (1,726 additional pennies) = 1,727 pennies

Total pennies:

$$(143{,}696\,pennies) \bullet (1{,}727\,pennies) = 248{,}162{,}992\,pennies$$

Unfortunately, I was being overzealous and am now over-counting the amount of pennies I can place on the bridge.



As the picture shows, every other row breaks the constraints of the bridge's dimensions.

To compensate for this, only half of the rows will be short 1 penny, and the other half will contain the full amount.

Full-length rows:

$$(143{,}696\,pennies)\bullet\frac{1{,}727\,pennies}{2}=124{,}081{,}496\text{pennies}$$

Not-so-full rows:

$$(143{,}695\,pennies)\bullet\frac{1{,}727\,pennies}{2}=124{,}080{,}632\text{pennies}$$

Total pennies:

$$124{,}081{,}496\,pennies+124{,}080{,}632\,pennies=248{,}162{,}128\text{pennies}$$

In conclusion, the total amount of pennies that one can put on the Golden Gate Bridge without overlap is 248,162,128 pennies.