

Scroll:

There are three regular pentagons, each with inner angles of 108 degrees.

Urn:

It's okay to look up any of them online. For example, you can use [The Math Genealogy Project](#) to look up the numbers of PhD students.

Flip Chart:

While it's fun to graph this by hand, it's okay to use an online tool such as [Desmos](#).

Your answers should all be positive whole numbers.

**The Crate:**

1. If only locations  $i$  and  $j$  have property  $P$ , then the remaining locations cannot have property  $P$ .
2. One may start with issue 3 because there is only one copy for each era.
3. It might be easier to keep track what issues are “used”. Fill the gap using the “un-used” one(s).

**The Bag:**

1. How many colors are there in a tower?
2. Which color is on the top? Which colors are at the bottom?
3. How many ways are there to form the non-rotationally equivalent bottom?

**The Briefcase:** Let  $1 \leq r \leq 3$  ( $1 \leq c \leq 3$ ) be the number of consecutive tokens in the same row (column) as the placed token.

1. If the placed token is neither the isolated token in its row nor the isolated token in its column, then we earn  $\$(r + c)$ .
2. If the placed token is the isolated token in its row and/or the isolated token in its column, then we earn  $\$(r + c - 1)$ .

Therefore, to maximize the amount of money, we could make the isolated token in its row also the isolated token in its column. That is, we reduce the number of  $\$(-1)$ . To minimize the amount of money, we could make more isolated token in its row or in its column. That is, we increase the number of  $\$(-1)$ . Be careful! For some cases, although we obtain  $\$(r + c - 1)$  when placing a token, either  $r$  or  $c$  may be large.

Hint for the final clues

The final password is simultaneously 21 letters long and 6 letters long.