Metrology Lab (Solution)

Jay Qi

Throughout the puzzle are 12 letter-in-a-circle symbols, Ⓐ through Ⓛ. There are two section headers in the puzzle: Calibration and Measurements. Following the puzzle's theme of a research lab at the station concerned with metrology—the science of measurements—we'll need to first calibrate our instruments (i.e., decoding the 12 symbols) before we can read the measurements.

For calibration, there are 8 entries with various units of time (plus "Gettysburg Addresses"). As clued by the symbols appearing alongside 0's and decimal points, they are encoded numbers. There is a helpful clue hidden in the "Measurements" section about what we are trying to measure. Reading the first letters of the first twelve entries in the left column spells the message **MEASURE A YEAR**. This helps us find the substitution cipher between the 12 symbols and the numbers 1 through 12, so that all entries in the "Calibration" section are equivalent to one year, with one Gettysburg Address equal to four score and seven years.

Ⓐ	3
Ⓑ	9
Ⓒ	12
Ⓓ	7
Ⓔ	6
Ⓕ	10
Ⓖ	8
Ⓗ	1
Ⓘ	2
Ⓙ	4
Ⓚ	11
Ⓛ	5

365	Days
1/10	Decades
0.0114942...	Gettysburg Addresses
8760	Hours
525600	Minutes
12	Months
31536000	Seconds
52.1428...	Weeks

With this substitution cipher, we can now read the measurements. A key observation is that each decoded number is always less than the length of the associated unit word/phrase, and so the common puzzle hunt mechanic of indexing into the word/phrase is a natural fit. For example, "3 Midnights" yields `D`, "4 Empires" yields `I`, etc. Performing this on all of the measurements extracts the message **DISCARD IF ITS A PHONY EXTRANEOUS ERRONEOUS INAPT OBSERVATION**.

This message is an instruction for the next step—we need to discard some of the measurements as "phony", "extraneous", "erroneous", and "inapt". The necessary insight is that

the earlier clue phrase "Measure a year" and the calibration entry "525600 minutes" are famously lyrics from the song "Seasons of Love" from the musical *Rent*. (This is well-known enough that googling "Measure a year" should be sufficient to find the song.) That song asks, "How do you measure, measure a year?" and continues with "In daylights, in sunsets / In midnights, cups of coffee" and so on. By examining the lyrics to the song, we will find that many of the measurement units are from the lyrics and directly answer that question. Keeping only those measurement entries that "measure a year" and discarding the rest extracts a shorter message: **`DAPHNE OR ROSARIO`**. This is a clue for the final answer—the character from *Rent* played by Daphne Rubin-Vega on Broadway and Rosario Dawson in the film: **`MIMI MARQUEZ`**.

Construction notes

"Seasons of Love" is a great song, and I settled on it early as something I wanted to use in the `MIMI MARQUEZ` puzzle. However, I was also the author of last year's puzzle Old Caroler's Square, and initially I had writer's block and struggled to think of interesting ideas that didn't feel derivative of Old Caroler's Square. Fortunately, the Antarctic research station setting inspired a shell theme around scientific measurement to add a light disguise to "Seasons of Love".

An earlier version of this puzzle had the non-Seasons-of-Love measurements extract to random letters, and flavortext clued discarding them to extract the final clue phrase. Eshan, who was the editor for this puzzle, made the suggestion of embedding the clue phrase in a longer message. I really liked this idea, especially as a way of replacing flavortext, since I had recently listened to the *Arguing About Puzzles* podcast episode about flavortext. This also more elegantly "used up" the non-Seasons-of-Love measurements so they weren't extra data. Amusingly, we still saw solvers who picked up on "Seasons of Love" during calibration who skipped extracting the long clue phrase. They directly extracted the final clue phrase and did not realize those measurements were used as part of the solve path.