

**Class title:** Mental Math & Memorization

**Goals:**

After taking this class, I hope that students will have a new understanding of the scope of what's possible when it comes to mental math. Square roots, cube roots, natural logarithms — none of these are beyond the power of mental math when it is paired with efficient and powerful memorization.

This class aims to introduce different strategies for memorizing information, like the digits of pi, the periodic table, shuffled decks of cards, and phone numbers (or credit card numbers!). This includes the methods that the record-holder pi memorizers use to recite many tens of thousands of digits. After taking this class, students will also be able to calculate the day of the week their friends were born on and will be shown how to generalize the Day of the Week algorithm to mentally calculate the day of the week for any date, future or past. Students will also be able to mentally calculate the square root of most numbers under 1000, and be shown how to generalize the approach to approximate the square root of any number.

Specific abilities that students will walk away with after the one-hour course:

- Memorize digits of pi and other long numbers
- Mentally calculate the day of the week for birthdays in early 2000s
- Mentally calculate/approximate square roots of numbers < 1000

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**Outline of topics, with time breakdown:**

I will begin with a brief introduction and demonstration of Triple Processing (see [here](#)). (10 min)

I will then segue to a discussion of the methods used to memorize the digits of pi, and lead from there into more general memorization strategies, for things like decks of cards and random strings of numbers. (10 min)

Then I will talk about the Day of the Week algorithm, and ask several students for their birthdays and calculate the days of the week they were born on, to work through examples. (15 min)

Next, I will talk a little about the square root algorithm, and do several examples, to teach the students that approach (15 min).

Ten minutes will be left at the end for buffer and questions. (10 min)

Total:  $10 + 10 + 15 + 15 + 10 \text{ buffer} = 60 \text{ min} = 1:00 \text{ hr.}$

**More detailed plan for each topic:**

*Introduction:* A little about myself and when I started memorizing pi, how I came to be interested in mental math and Day of the Week calculations, and a step-by-step buildup to Triple Processing (first reciting pi, then calculating a Day of the Week, then doing a square root, and finally, putting it all together.)

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**Modes of engagement:**

I will mostly rely on my previous experience giving exciting presentations and tutoring math in an engaging way. But I also plan to include several questions for the group, such as birthdays and numbers for calculation. I will be projecting some slides, as well.

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**Temporal wiggle room:**

If the introduction runs long, I will get back on track by cutting the discussion of more general memorization strategies and focus on the numerical memorization methods.

If the memorization discussion runs long, or the beginning of the Day of the Week explanation, I will do fewer student examples, and instead forge ahead to square roots.

If, somehow, things go faster than planned, I will discuss the difference between *sequential* and *non-sequential* memorization, and how both approaches have their place, but are more useful in different situations. I expect that there will be a fair number of questions, so any additional time can also be used for these.

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**Materials/spaces:**

No materials need to be purchased. The ability to project a few slides from my laptop will be useful, but not essential. If no projecting solution exists, I could show up a little early to write the digits of pi on the whiteboard, if there's one in the classroom. Ideally I would be able to project a few slides, though.