

# Perfect Square Dates in Ben Franklin's Life



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As a boy, Benjamin Franklin (1706-1790) began creating "magic squares," consisting of smaller squares of identical sizes with assigned numbers inside a large square. These were arranged so that the sums of the numbers along each row, column, and diagonal were equal. Franklin claimed that his most difficult magic square, made up of 16-by-16 smaller squares, was "the most magically magical of any magic square ever made by any magician." In addition to his magic squares, are there other squares in Franklin's life? The answer is yes, and here are some examples involving dates.

First of all, the year 1764 in Franklin's life is a square year since it is the square of 42, that is, 42 times 42. Second, Franklin's life also includes a cube year, where a cube can be thought of as a three-dimensional version of a square: 1728, 12 times 12 times 12. Third, Franklin's lifetime also has perfect square dates<sup>1,2</sup>, 12061729 and 6041764. These are full date numbers,

expressed as an eight-digit number in the format DDMMYYYY (that is, the first two digits are reserved for the day, the next two for the month, and the last four for the year) or MMDDYYYY (in the United States, the day and the month numbers are switched). For example, Franklin's birthday (January 17, 1706) is expressed as a full date given by 17011706 in the DDMMYYYY date format and 1171706 in the MMDDYYYY date format. A "perfect square date" is defined as a full date number that is a perfect square, i.e., it is a square number. Full date numbers 12061729 and 6041764, the squares of 3473 and 2458 respectively, are the only two perfect square dates that occurred in the eighteenth century and both of these dates occur in Franklin's lifetime. In the DDMMYYYY date format, date number 12061729 corresponds to June 12, 1729 and 6041764 is April 6, 1764. On the other hand, in the MMDDYYYY date format, number 12061729 corresponds to December 6, 1729 and 6041764 is June 4, 1764.

Since Franklin spent many years in Europe where the DDMMYYYY date format is dominant, these two perfect square dates from his life can be interpreted in either format. Based on the fact that 12061729 and 6041764 each represent two separate dates, one interpreted in DDMMYYYY and the other in MMDDYYYY date format, one could conclude that Franklin had not two, but four perfect square dates in his lifetime. Two of the four perfect square dates

occurred on June 12 and December 6 in 1729 and the other two occurred in 1764 on April 6 and June 4. It is also interesting to note that Franklin was 23 on the perfect square date 12061729, which is divisible by the square of 23.



Aziz S. Inan, who is celebrating his 20th year at the University of Portland, is a professor of electrical engineering. For another look at his interest in history and numbers, please go to <http://www.ieee.org/organizations/pubs/newsletters/emcs/fall06/franklin.pdf>.

Inan recently discovered the existence of perfect square dates and published the above two articles. This year, March 5 and April Fools' Day were both perfect square dates since 3052009 and 4012009 are squares of 1747 and 2003. *USA Today* and *Oregonian* newspapers reported Inan's discovery around April Fools' Day. [http://www.usatoday.com/tech/science/columnist/vergano/2009-03-28-square-dates\\_N.htm](http://www.usatoday.com/tech/science/columnist/vergano/2009-03-28-square-dates_N.htm); <http://www.oregonlive.com/business/oregonian/index.ssf?/base/business/1238556327291410.xml&coll=7>.

Inan is currently preparing a recreational mathematical puzzle book. He can be reached at 503-943-7429 or [ainan@up.edu](mailto:ainan@up.edu).

<sup>1</sup>Aziz Inan, "Century of Squares," *The Beacon, University of Portland*, 110(18), February 26, 2009, p. 14. <http://media.www.upbeacon.net/media/storage/paper1193/news/2009/02/26/Opinions/Century.Of.Squares-3651254.shtml>

<sup>2</sup>Aziz Inan, "A Numerical Milestone, No Foolin'," *The Beacon, University of Portland*, 110(22), April 2, 2009, p. 13. <http://media.www.upbeacon.net/media/storage/paper1193/news/2009/04/02/Opinions/A.Numerical.Milestone.No.Foolin-3695068.shtml>

## Spring 2009 Math Puzzle

**Problem # 9:** Ben's book. Ben Franklin started writing one of his famous books in the year  $x$  at age  $y$  where  $y$  equals the sum of the sum and product of the digits of  $x$ . Which year is  $x$ ?

(Source: Inan. Answer: 1771.)

**Editor's Note:** Here is another Franklin themed math puzzle presented by Aziz Inan ([ainan@up.edu](mailto:ainan@up.edu)) and the solution to the problem posed in the Winter issue of the Gazette.

(Solution: Let the year  $x$  be represented by  $17AB$  since it has to fall during Ben Franklin's lifetime (1706-1790). In  $17AB$ , Ben's new age equals  $17AB - 1706 = 10A + B - 6$ . The only year  $17AB$  that satisfies the equation  $10A + B - 6 = (8 + A + B) + 7 \times A \times B \rightarrow A = 14/(9 - 7B)$  is 1771. In 1771, at age 65, while visiting his friend Bishop Jonathan Shipley in Twyford, England, Ben started writing the first section of his famous *Autobiography*, published in 1791.)

**Problem # 10:** Cube date if Ben lived longer. If Ben Franklin (1706-1790) lived longer, what would have been the earliest cube date in his life and what would be his age on that date? Note that a cube date in a four-digit year is defined as an eight-digit full date number MMDDYYYY (where the first two-digits correspond to the month, the next two to the day, and the last four to the year numbers) that equals the cube of an integer number.