




THE SECRETS OF MENTAL MATH



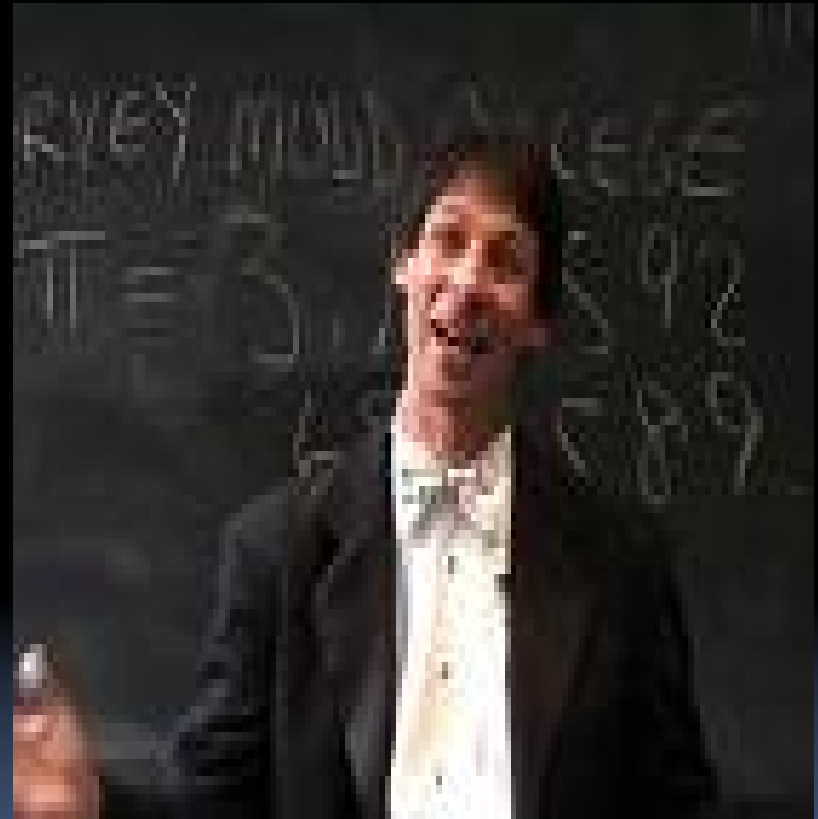


Great Mathematicians

- Blaise Pascal
 - Leonardo Fibonacci
 - David Hilbert
 - Isaac Newton
 - Archimedes
 - Who's Next???
- 

Arthur T. Benjamin

- Bachelor of Science from Carnegie Mellon
- PhD from Johns Hopkins
- Professor at Harvey Mudd
- Mathemagician
- Presentations around the globe
- Advanced calculations
- Mathematical agility
- “America’s Best Math Whiz” – *Reader’s Digest*



Not to be confused with Arthur Benjamin

His Presentation



- Mentally multiply large numbers
- Mentally square five digit numbers
- Memorize Pi to one hundred digits
- Master of Phonetic Code
- And more!

Mathemagics

- Mental math
- Math tricks :
 - Pick a number
 - Whoa! Take it easy, make it 1 or 2 digits
 - Double it
 - Add 12
 - Divide by 2
 - Subtract original number

Is the number

6?

Why Every Number Always Goes To 6

Your number is x

Double it: $2x$

Then add 12: $2x + 12$

Then divide by 2: $(2x + 12) / 2 = x + 6$

Then subtract the original number: $x + 6 - x = 6$

Magical 1089

- Pick a three digit number (with the digits decreasing)
- Reverse number
- Subtract reverse from original
- Call this new answer: Answer X
- Add Answer X to the reverse of Answer X

Does it equal 1089?

If not, you made a mistake!

Why Every Number Always Goes To 1089

➤ $abc = 3$ digit number

➤ This equals: $100a + 10b + c$

➤ $cba =$ reverse of 3 digit number

➤ This equals $100c + 10b + a$

➤ Subtracting cba from abc equals:

$$(100a + 10b + c) - (100c + 10b + a)$$

$$= 100(a - c) + (c - a)$$

$$= 99(a - c)$$

➤ We now receive one of the following multiples of 99:

198, 297, 396, 495, 594, 693, 792, 891

➤ Adding the reverse of any of these numbers produces the answer 1089

Multiplying by 11

➤ Two digit number

➤ Steps:

Add the digits

Place in between the digits

➤ Exception to the rule:

If sum is greater than 9

Add the digits

Place second number in between the digits

Add the 1 to the first digit of the new number

Squaring Numbers That End in 5

- Multiply first digit (or all digits but the last one for three digit numbers or more) by next highest number
- Place 25 at the end of new number
- Example: 25×25

$$2 \times 3 = 6$$

$$25 \times 25 = 625$$

Memorizing Dates


- Monday-1
- Tuesday-2
- Wednesday-3
- Thursday-4
- Friday-5
- Saturday-6
- Sunday-7 or 0
- January-6*
- February-2*
- March-2
- April-5
- May-0
- June-3
- July-5
- August-1
- September-4
- October-6
- November-2
- December-4

Memorizing Dates Continued

Year Codes

- $2000 + x$
- $x/4$ (ignore remainder)
- Add new number to x
- Subtract the nearest multiple of 7 to reduce
- 1900's add 1 to year code
- 1800's add 3 to year code
- 1700's and 2100's add 5 to year code

(Month Code + Date + Year Code) - nearest multiple of 7 =
Day

A portrait of Arthur Benjamin, a man with dark hair, wearing a pink shirt and a dark tie, smiling slightly. The background is a blurred green foliage.

Arthur
Benjamin
Mathemagician

<http://www.math.hmc.edu/~benjamin/>

http://www.youtube.com/watch?v=M4vqr3_ROIk