Calculator Tricks

(A very special thanks to Bob Kurosaka, retired math professor, for generously sharing these tricks!)

Is That Your Final Answer?

Have someone pick a number between 1 and 9.
Now have them use a calculator to first multiply it by 9, and then multiply it by 12,345,679
Have the person show you the result so you can tell them the original number they selected! How? Easy. If they selected 5, the final answer is 555,555,555. If they selected 3, the final answer is 333,333,333. The reason: 9 x 12345679 = 111111111. You multiplied your digit by 111111111. (By the way, that 8-digit number (12,345,679) is easily memorized: only the 8 is missing from the sequence.)

The 421 Loop

Pick a whole number and enter it into your calculator.
If it is even, divide by 2. If it is odd, multiply by 3 and add 1.
Repeat the process with the new number over and over. What happens?
The sequence always ends in the "loop": 4...2...1...4...2...1...
Example: Start with 13.
13 is odd, so we multiply by 3 and add 1. We get 40. (13 x 3 = 39 + 1= 40)
40 is even, so we divide by 2. We get 20. (40 / 2 = 20)
20 is even, so we divide by 2 and get 10.
10 is also even so we divide by 2 again and get 5.
5 is odd so we multiply by 3 and add 1. We get 16.
16 is even, so we divide by 2 and get 8.
8 is also even so we divide by 2 again and get 4.
4 is even so we divide by 2. We get 2.
2 is even, so we divide by 1 and get 1.
1 is odd, so we multiply by 3 and add 1. We get 4.
4 is even so we divide by 2. We get 2. And so we begin the loop 4...2...1...4...2...1...

Good Luck or Bad Luck?

Have someone secretly select a three-digit number and enter it twice into them calculator.
(For example: 123123) Have her concentrate on the display. You will try to discern them thoughts!
From across the room, announce that the number is divisible by 11. (Have them verify it by dividing by 11.)
Announce that the result is also divisible by 13. Have them verify it.
Have him divide by his original three-digit number.
Announce that the final answer is 7.
You can use this to predict Good Luck for him. If you wish to predict Bad Luck, have him divide by 7 in step 3; the final answer will be 13.
Why does this work? Entering a three-digit number twice (123123) is equivalent to multiplying it by 1001. (123 x 1001 = 123,123). Since 1001 = 7 x 11 x 13, the six-digit number will be divisible by 7, 11, 13, and the original three-digit number.

Calculator Tricks continued

The Secret of 73
For this trick, secretly write 73 on a piece of paper, fold it up, and give to an unsuspecting friend.
Now have your friend select a four-digit number and enter it twice into a calculator. (For example: 12341234)
Announce that the number is divisible by 137 and have him verify it on his calculator.
Next, announce that they can now divide by his original four-digit number. After they have done so, dramatically command him to look at your prediction on the paper. It will match his calculator display: 73!
Why does this work? Entering a three-digit number twice (12341234) is equivalent to multiplying it by 10001. (1234 x 10001 = 12341234). Since 10001 = 73 x 137, the eight-digit number will be divisible by 73, 137, and the original four-digit number.

The 6174 loop
Select a four-digit number. (Do not use 1111, 2222, etc.)
Arrange the digits in increasing order.
Arrange the digits in decreasing order.
Subtract the smaller number from the larger number.
Repeat steps 2, 3, and 4 with the result, and so on. What happens?
Let's try 7173
Arrange the digits in increasing order. 1377
Arrange the digits in decreasing order. 7731
Subtract the smaller number from the larger number. 7731 - 1377 = 6354
Repeat the process with 6354
6543 - 3456 = 3087
8730 - 0378 = 8352
8532 - 2358 = 6174
7641 - 1467 = 6174
7641 - 1467 = 6174
7641 - 1467 = 6174 (we're in a loop!)
Amazingly, all four-digit numbers (not multiples of 1111) end up in the 6174-loop.
No reason has been found for this phenomenon by this author.

Calculator Tricks continued

The Golden Prediction

This trick takes considerable time, but the effect is spectacular.
Give someone a sheet of paper and a pencil and tell him to:
Number the first 25 lines (1, 2, 3,...).
Write any two whole numbers on the first two lines.
Add the two numbers and write the sum on the third line.
Add the last two numbers and write the sum on the next line.
Continue this process (add the last two, write the sum) until they have 25 numbers on their list.
Select any number among the last five on his list, and divide by the previous number (the number above it).
Now for the trick! Remind him that you do not know his original two numbers or any of the 25 numbers, that you do not know which of the 25 numbers they selected right now, and therefore you cannot possibly know the number on the display. With great concentration and much difficulty, you divine the number presently on his calculator: "I'm getting a One... then something funny - oh! a decimal point! Then... a Six.. another One.. and an Eight, I think.. Now I'm getting a blank.. nothing... Oh! It's a Zero!.. then a Three... and... another Three?... then a Nine... had enough?"
That's right! If your subject selects any number between the last five (#21 through #25) and divides it by the number above it, they'll always get 1.618033989..., which just happens to be the Golden Mean! (provided, of course, they did all the addition correctly in steps 3-5 above)
Why does this work? It's an incredible bit of mathematical trivia. Begin with any two whole numbers, make a Fibonacci-type addition list, take the ratio of two consecutive entries, and the ratio approaches the Golden Mean! The further out we go, the more accurate it becomes. That's why we need 25 numbers: to obtain sufficient accuracy. The proof requires familiarity with the Fibonacci Sequence, pages of algebra, and a knowledge of limits, all of which go far beyond the scope of explanation.
Interesting fact: if you divide one of your last 5 numbers by the next number (instead of the previous number), the result is the same decimal without the leading 1. (0.618033989)