

# You Can't Keep a Secret

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The following is an updated version of a very simple arithmetic fun game suitable for elementary grade students:

1. Select an integer between 1 and 10.
2. Double.
3. Add 5.
4. Multiply by 50.
5. Add 1730.
6. Subtract the year in which you were born ( $1880 < \text{year} \leq 1980$ ).
7. State the result obtained.

*Key:*

The first digit in your answer is the number selected. The remaining digits give your age in the year 1980.

*Proof:*

Let  $n$  be an integer such that  $2 \leq n \leq 9$ ,  $x$  be an integer such that  $-20 < x \leq 80$ , so that  $1900 + x$  will be the year of birth, and let  $y$  be your age in 1980.

Apply the required steps to obtain  $50(2n + 5) + 1730 - (1900 + x) = 100n + y$ , which simplifies to yield  $x + y = 80$ , which is independent of the choice of  $n$ .

Since  $-20 < x \leq 80$ , it follows that  $0 \leq y < 100$ . Hence, the procedure will always work as long as the year of birth is restricted as stated.

*Note:*

For years 1880 and before, the amount added in Step 5 has to be *reduced*. In this case, the procedure will not work up to 1980, so a corresponding *reduction* in the number 1980 will be necessary.

After 1980, an update is accomplished by *increasing* the number in Step 5.