

MEMORY – Memory Game and Trainer

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Abstract

MEMORY is a game program written in 1979 for the HP-34C programmable calculator to challenge your memory by testing your ability to remember what you've just seen and offering afterwards an accurate comment on your performance.

Keywords: *Memory, game program, trainer, programmable calculator, RPN, HP-34C, Hewlett-Packard*

1. Introduction

MEMORY is a fun RPN game program I wrote in 1979 for the *HP-34C* programmable calculator to try and test your ability to accurately remember series of digits, shown as a variable-length integer number randomly generated by the program. Each number is displayed for about 2 seconds and then you're prompted to enter it. Your guess is scored depending on the number of correct digits and a total score is kept. Perfect recall will be rewarded with a longer number in the next round (up to 10 digits) while an incorrect guess will result in a shorter number instead (at least 1 digit).

You must enter at least one digit for every guess. A guess ≤ 0 is not acceptable and will stop execution with an error. Some remarks:

- extra digits will be ignored: if 345 is correct then a guess of 345678 is totally right (scores 3 digits).
- wrong digits don't spoil all: if 269 is correct then guessing 26 scores 2 correct digits, and if 387 is correct then guessing 389 also scores 2 correct digits.

After 3 incorrect guesses the game ends and the score will be displayed, which will be the total number of digits correctly guessed. You can then assess the quality of your memory by using the score to get the appropriate evaluation in the table below:

Score	Evaluation	Description
< 15	NEAR AMNESIA	You should really seek help ASAP, memory this bad can be dangerous
15-29	SO PATHETIC	Your memory is seriously faulty or you need to pay more attention
30-44	VERY POOR	The evaluation says it all, very poor memory or you lack concentration
45-59	SIMPLY POOR	Your memory is poor, you'll need hard training to try and improve it
60-74	JUST AVERAGE	Average memory but still not a lost cause, train regularly to improve it
75-89	QUITE GOOD	Decent memory, a little training will get you to the next level in no time
90-104	REALLY GOOD	Pretty good memory, playing this game regularly will do wonders
105-119	TRULY SUPERB	Quite impressive, either you're a natural or you've trained really hard
≥ 120	PHOTOGRAPHIC	Wow, eidetic memory, you're a natural for sure, hats off to you

In order to generate the pseudo-random integers for the game, and as the *HP-34C* lacks a built-in *RNG* (*Random Number Generator*), the program implements a simple one but you must first of all store a *seed* (some nonnegative number of your choice, see *Note 1*) in register R_1 before running the program. This needs to be done just once per session, no matter how many games you play afterwards.

2. Program Listing

01	◆ <u>LBL</u> A	18	x	35	X=Y?	52	X=Y?	69	GTO 0 ▶	
02	FIX 0	19	INT	36	GTO 2 ▶	53	GTO 1 ▶	70	GTO 0 ▶	
03	CLX	20	STO 2	37	◆ <u>LBL</u> 1	54	SF 0	71	◆ <u>LBL</u> 3	
04	STO I	21	PSE	38	RCL 3	55	1	72	CF 0	
05	STO 4	22	PSE	39	RCL 2	56	STO- 5	73	2	
06	STO 5	23	CLX	40	X=Y?	57	GTO 1 ▶	74	RCL 4	- 86 steps
07	◆ <u>LBL</u> 0	24	R/S	41	GTO 2 ▶	58	◆ <u>LBL</u> 2	75	X=Y?	- uses flag 0
08	RCL 1	25	ENTER ↑	42	1	59	1	76	GTO 4 ▶	- sets display mode FIX 0
09	R-D	26	LOG	43	0	60	STO+ 5	77	RCL I	
10	FRAC	27	INT	44	STO+ 2	61	RCL I	78	1	- the symbols ◆ and ▶ are
11	STO 1	28	RCL I	45	STO+ 3	62	STO+ 5	79	STO+ 4	purely cosmetic, to visually
12	9	29	-	46	RCL 2	63	F? 0	80	X<=Y?	indicate branching,
13	x	30	10 ^x	47	FRAC	64	GTO 3 ▶	81	DSE	don't try to key them in.
14	1	31	÷	48	STO- 2	65	CF 0	82	GTO 0 ▶	
15	+	32	INT	49	RCL 3	66	9	83	GTO 0 ▶	
16	RCL I	33	STO 3	50	FRAC	67	X>Y?	84	◆ <u>LBL</u> 4	
17	10 ^x	34	RCL 2	51	STO- 3	68	ISG	85	RCL 5	
								86	CHS	

3. Usage Instructions

To use the program follow these steps:

1. Key in the program from the listing above and make sure it's correctly loaded.
2. Store the initial seed for the random number generator (some nonnegative number of your choice, see *Note 1*)

(seed) **STO** 1

3. Start the game:

A → (number to remember, appears for 2 seconds) → 0

4. Key in your guess (as many digits as you can correctly remember):

(your guess) **R/S** → (next number to remember, shown for 2 sec.) → 0

The next number to remember will be one digit *longer* if you previous guess was Ok, and one digit *shorter* otherwise. See the remarks in *Introduction* above.

5. Repeat *step 4* until you fail **3** times. Once this happens your final score will be displayed, preceded by a “-“ sign to distinguish it from yet another try. Now simply look your score up in the table above to get the evaluation for your memory's performance in this run.
6. For another game, go to *step 3* above.

4. Examples

The following example can be useful to check that the program is correctly entered and to understand its usage:

4.1 Example

Using **0.1979** as a seed, try and test your memory by running the program, like this:

```
0.1979 STO 1 (store the seed for the RNG, do it just once per session, no matter how many games you play afterwards)
```

	A	→	4	→	0	(first try, just one digit to remember)
4	R/S	→	47	→	0	(Ok, now 2 digits)
47	R/S	→	738	→	0	(Ok, now 3 digits)
738	R/S	→	6668	→	0	(Ok, now 4 digits)
6668	R/S	→	17590	→	0	(Ok, now 5 digits)
17590 <u>1</u>	R/S	→	849207	→	0	(Ok, never mind extra digits, now 6 digits)
847207	R/S	→	72642	→	0	(1 st oops, back to 5 digits)
72642	R/S	→	891340	→	0	(Ok, now 6 digits)
8913 <u>6</u> 0	R/S	→	44048	→	0	(2 nd oops, back again to 5 digits)
44048	R/S	→	708154	→	0	(Ok, now 6 digits)
708154	R/S	→	7446633	→	0	(Ok, now 7 digits)
7446633	R/S	→	13648859	→	0	(Ok, now 8 digits)
13648859	R/S	→	390642321	→	0	(Ok, now 9 digits)
3906423	R/S	→	-63			(last two digits missing so 3 rd and last failure, the game ends with a score of 63)

Looking up the score **63** in the table evaluates your memory as *JUST AVERAGE* but this was but an example.

Why don't you give it a try for real and see how you fare ?

Notes

1. Don't use 0 or negative seeds and also avoid **PI** and its multiples or fractions, as well as very large numbers.
2. If you'd prefer having the number stay for longer than 2 seconds, insert as many **PSE** steps as desired after **22 PSE** for an easier game.
3. Practice makes perfect: try some sessions each day, concentrate *hard*, and you might find your memory evaluations increasing over time. Once training improves your memory (you mostly get *PHOTOGRAPHIC*), simply *delete 22 PSE* to make it harder and keep improving.
4. This training side of the game can actually be *very useful* to help keep the memory from degrading or even to noticeably improve it.
5. I also wrote a version of this program for the **HP-41C** Series models, with full alphanumeric prompting and evaluations. See *References*.

References

Valentin Albillo (2019). *HP Program VA418 - HP-41C Memory Game and Trainer*

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