

# What Display Number?

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You have just received your new HP calculator and you want to take a photograph of it. You get out your digital camera and set it to macro mode. You move the calculator to the window sill for good lighting, and you start to take the photograph. Then you notice the display. The calculator should be turned on to show that it is alive, but what number do you put into the display?

This is going to be your photograph of your calculator so you take a few minutes to think about this question. A non-blank display is desirable, but an informative display requires considerable thought, planning, and effort. This situation came up recently and I wondered what would be the simplest and easiest calculator display to use if I had to photograph a calculator. To answer this question I made a list of four practical requirements.

- i. A simple, mathematically interesting, and informative number to be used for 8 to 15 digit displays.
- ii. The number should include as many of the digits 0 to 9 as possible.
- iii. The number must be easily and quickly input with one or two keystrokes, i.e. function produced.
- iv. A general method of generating the number should not require extensive knowledge of the machine.

What makes a number interesting? Two ideas come to mind. Normal numbers are either rational or irrational. Irrational numbers are much more interesting. Certain numbers are well known and easily recognized because they show up frequently in mathematics.

Another “interesting” number may be one that “begs to know what it means.” One such number (6.0030000004) appeared on the case of the HP38g some years ago, and it drove everybody nuts because it was assumed to have meaning. Many in the HP user Community searched for the function. It turned out that this number was an “artistic creation” (chosen because it had “balance”), and it had no mathematical meaning and no function had generated it.

With these considerations in mind I came up with three numbers that closely meet the requirements. Bold bracketed numbers indicate the number of missing digits zero to nine.

Here is an interesting less common number.

1.  $e = 2.71828 18284 59045$

8 digits: 2.71828 18 are missing 0, 7, 3, 4, 5, 6, & 9. [7]

10 digits: 2.71828 1828 are missing 0, 7, 3, 4, 5, 6, & 9. [7]

12 digits: 2.71828 18284 5 are missing 0, 7, 3, 6, & 9. [6]

This number is an improvement and certainly more famous.

2.  $\pi = 3.14159 26535 89793$ . This number provides all but three of the digits 0 – 9.

8 digits: 3.14159 27 are missing 0, 6, & 8. [3]

10 digits: 3.14159 2654 are missing 0, 7, & 8. [3]

12 digits: 3.14159 26535 9 are missing 0, 7, & 8. [3]

This irrational number could also work.

3.  $\sqrt{3} = 1.73205 08075 68877$ . This number provides all but three of the digits 0 – 9.

8 digits: 1.73205 08 are missing 4, 6, & 9. [3]

10 digits: 1.73205 0808 are missing 4, 6, & 9. [3]

12 digits: 1.73205 08075 7 are missing 4, 6, & 9. [3]

**Reader Challenge.** What other numbers are interesting and why? What other numbers meet the four criteria above? Send your suggestions to me at:

[rjnelsoncf "at" cox.net](mailto:rjnelsoncf@cox.net)

by May 26 (four weeks to study). I will quickly announce the winner on the HHC 2009 website. The winner will also receive a nice gift of appreciation for your efforts from a list of calculator items I have "collected" over the last 35 years. Since you are a obviously a "calcfan" by participating I think that you will like it. You also agree to have your submissions posted. One non-calculator choice is a very clean Tandy 200 Portable Computer. One calculator choice is a new HP33s.

The purpose of the contest is to have fun. I will use two criteria, when judging.

1. Compliance to the four guidelines above, and
2. Your justification for the suggestion (including a slight violation, 3 ks) of the guidelines. The creativity, width, and depth of your number suggestion will be a big factor in the judging. I will accept a maximum of two suggestions from each contestant.

Of course the decision of the judge will be final. Since I am conducting the contest anyone may participate – including the other Committee members. 😊

If you have any questions be sure to email me and I will post any clarifications as they are asked about. I will also post an update at the half way point which will include additional "winner's choices.

This issue was prompted by a recent major specific HP event which will be described, along with my six pages of thoughts on what makes a good HP Calculator display for photo taking.

Happy number testing.

X <> Y,

Richard  
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