Izzamajig

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C++ — 2 sec — 512 MB

Ever since their foundings (and miraculous survivals through the dot-com crash), M.O.T.H.E.R. has had a sororal rivalry with their sister company A.U.N.T.I.E.

Last month, A.U.N.T.I.E. released a ground-breaking new gadget: the *Izzamajig*. This new device has many similarities to M.O.T.H.E.R.'s *Wizzamajig* but also has Bluetooth, Redtooth, *and* Greentooth functionality. A.U.N.T.I.E. has already sold thousands of *Izzamajigs*, and the engineers at M.O.T.H.E.R. are becoming very jealous.

In order to compete, the executives at M.O.T.H.E.R. want to know exactly how many new devices A.U.N.T.I.E. is making (or roughly how many, they will accept roughly). Each *Izzamajig* is stamped with a unique serial number from 1 to **n** in hexadecimal. Super secret [redacted] (they're so secret, we can't tell you what they are) have begged, borrowed, and stolen **k** random *Izzamajigs* and reported their serial numbers. Using these numbers, the engineers are hoping to estimate the total number of *Izzamajigs* that A.U.N.T.I.E. has created.

The executives consider any estimate that is within 10% of the actual number of devices to be sufficiently accurate. 90% of test cases must be sufficiently accurate for the problem to be solved.

INPUT You will be given an integer, **k**, denoting the number of *Izzamajigs* that M.O.T.H.E.R. has obtained. This will be followed by *k* hexadecimal serial numbers on separate lines, randomly chosen between 1 and **n**.

$1 \leq \mathbf{k} \leq 2^{20}$
$10 \leq \mathbf{n} < 2^{60}$
$\mathbf{n}^{1/2} < \mathbf{k} < \mathbf{n}$

OUTPUT You should output a single integer, your estimate for the total number of *Izzamajigs* that have been created, **n**.