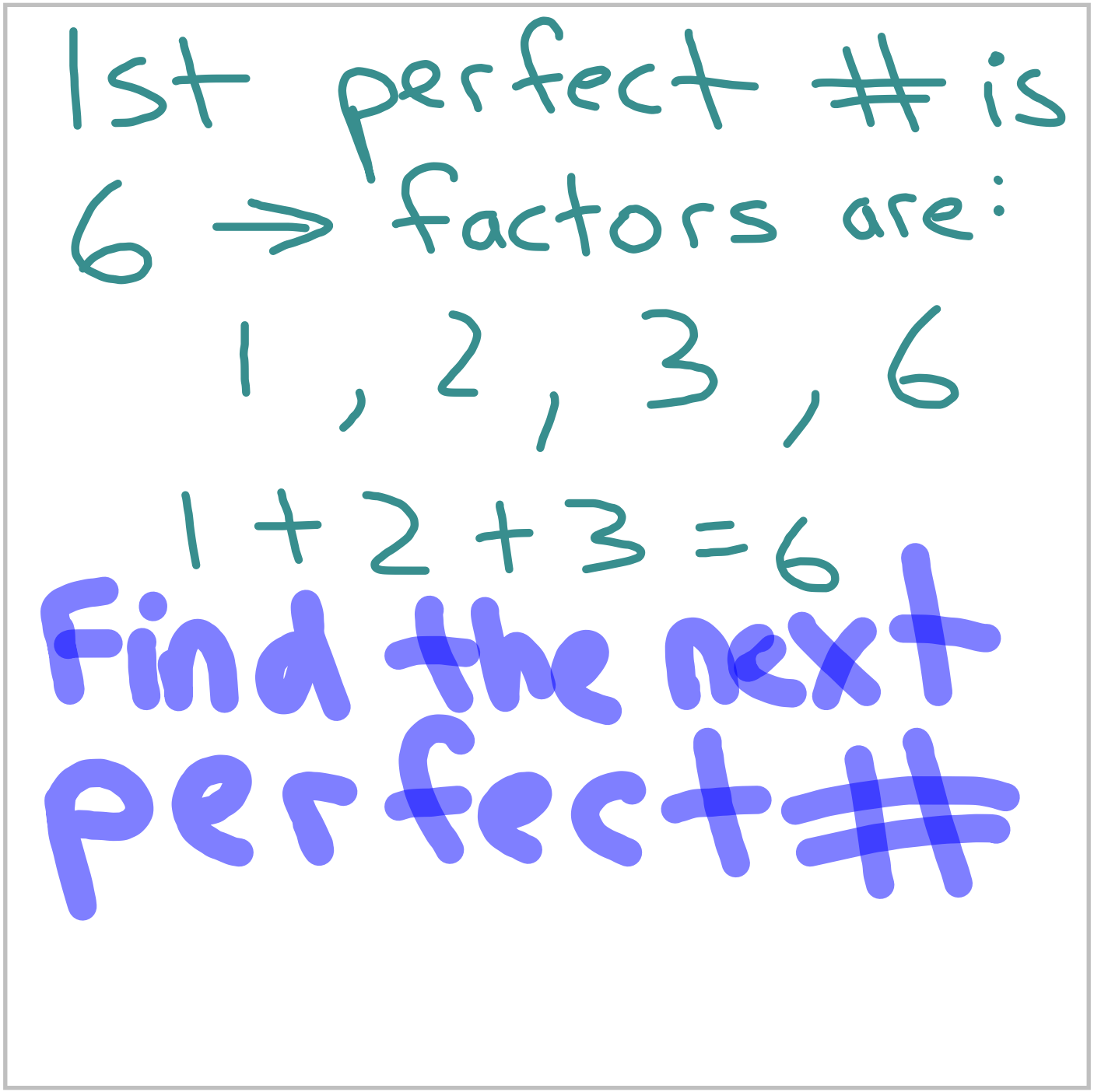
Perfect #s

* a number that is the sum of its factors except not including the # itself (example on next pg.)



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Euclid's Theory

Step 1 if $2^n - 1$ is prime,

Step 2 then $2^{n-1} * (2^n - 1)$ is a perfect #

example: let $n=2$; $2^2 - 1 = 3$;

3 is prime; therefore,

$2^{2-1} * (2^2 - 1) =$ perfect #

$2^1 * (4 - 1) =$ perfect #

$2 * 3 = 6$ (1st perfect #)

Try $n = 3$ (key on next pg.)

Try $n = 3$

$2^3 - 1 = 7$; 7 is prime;

$2^{3-1} * (2^3 - 1) =$

$2^2 * (8 - 1) =$

$4 * 7 = 28$ (second perfect #)

Try to find the 1st 5 perfect #s:

(there are only 42 known perfect #s)

Be careful at $n=11$

$2^{11}-1=2047$

it is not prime

$23*89=2047$

1st 5 perfect #s

perfect #	n =
6	2
28	3
496	5
8128	7
33,550,336	13

8,589,869,056 n = 17

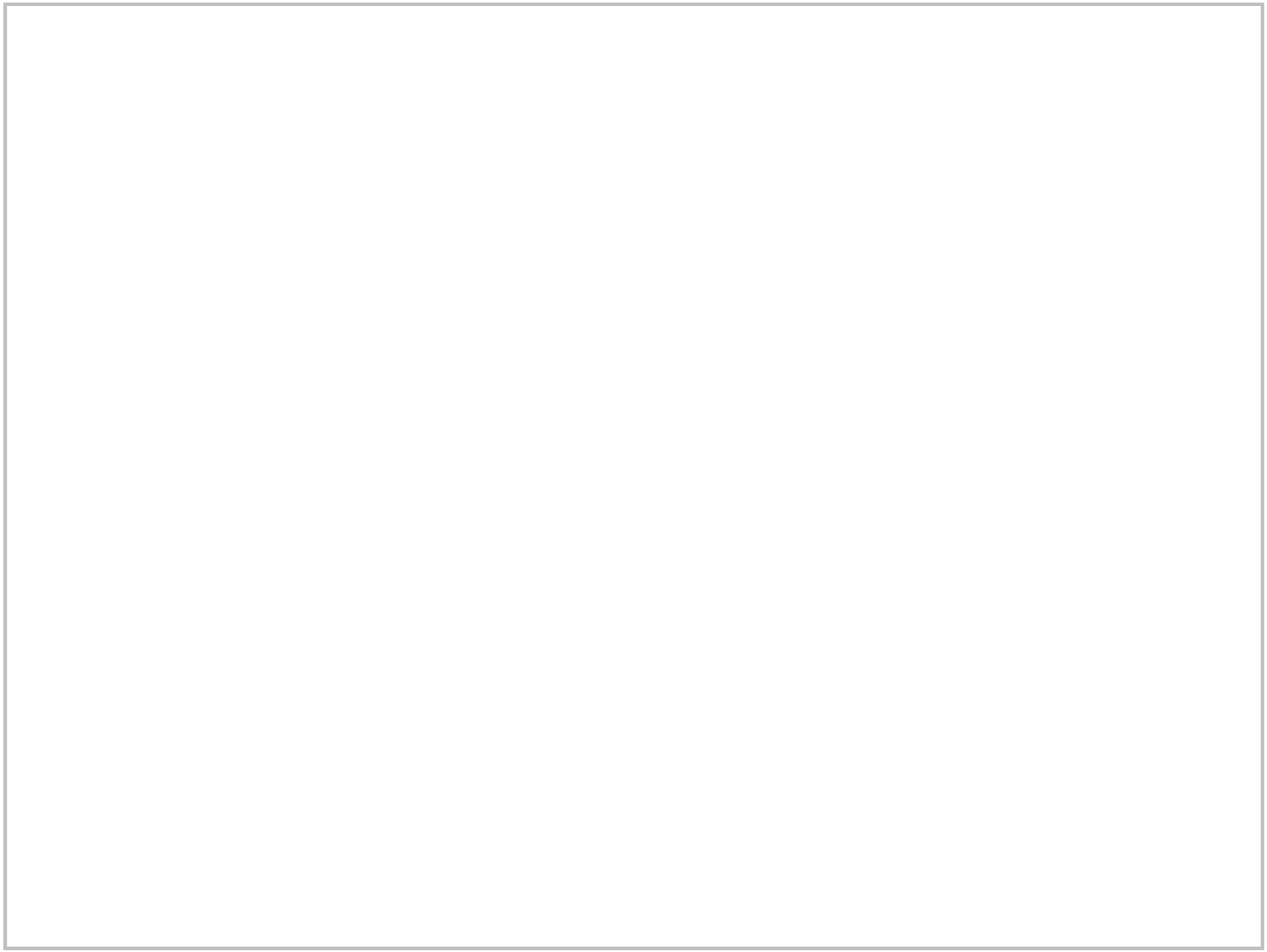
137,438,691,328 n = 19

2,305,843,008,139,952,128 n = 31

42nd and largest known perfect # as of 3/06 is:

$$2^{25964950} * \left(2^{25964951} - 1\right)$$

n=25964951



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