



## CEMC at Home

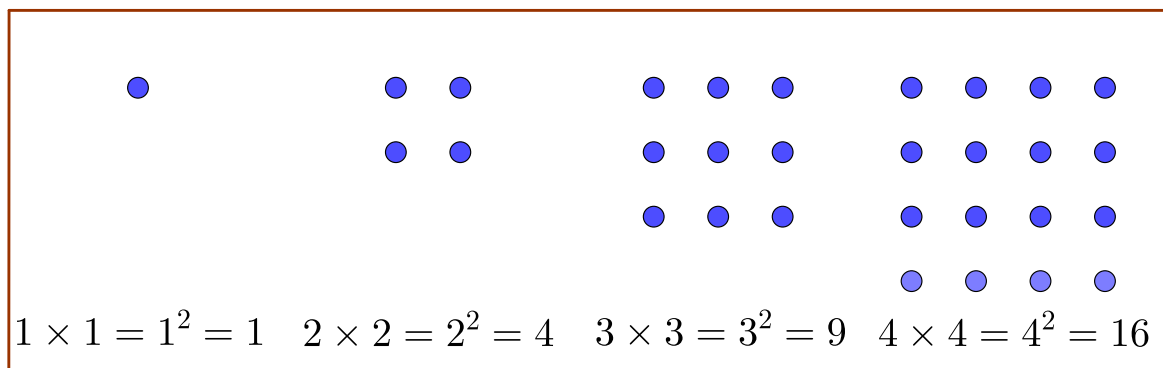
Grade 11/12 - Thursday, June 11, 2020

### That Number Makes it Perfect

A *perfect square* is an integer that can be expressed as the product of two equal integers. The integer 25 is a perfect square since it can be expressed as the product  $5 \times 5$  or  $5^2$ .

The positive even integers 2 to 1600, inclusive, are each multiplied by the same positive integer,  $n$ . All of the products are then added together and the resulting sum is a perfect square.

Determine the value of the smallest positive integer  $n$  that makes this true.



Did you know that the sum,  $S$ , of the positive integers from 1 to some positive integer  $n$  can be calculated using the formula  $S = \frac{n \times (n + 1)}{2}$ ?

For example,

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = \frac{10 \times 11}{2} = 55.$$

This result may be helpful in this problem.

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#### More Info:

Check out the CEMC at Home webpage on Friday, June 12 for a solution to That Number Makes it Perfect.

This CEMC at Home resource is a past problem from Problem of the Week (POTW). POTW is a free, weekly resource that the CEMC provides for teachers, parents, and students during the school year. POTW is wrapped up for the current school year and will resume on September 17, 2020. To subscribe to POTW and to find more past problems and their solutions visit:

<https://www.cemc.uwaterloo.ca/resources/potw.php>