

# The Factorization Method



Learn how to solve this *type* of problems, not just this problem.

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1. Find the number of different rectangles whose sides lengths are all integers and areas are 2015.
2. Find the number of positive integers solutions to  $x^2 - y^2 = 105$ .  
(Ref Ref 163)
3. Determine all positive integers  $m$  and  $n$  such that  $m^2 + 1$  is a prime number and  $10(m^2 + 1) = n^2 + 1$ .  
(Ref Ref 2821)
4. For positive integers  $n$  and  $m$ , each exterior angle of a regular  $n$ -sided polygon is 45 degrees larger than each exterior angle of a regular  $m$ -sided polygon. One example is  $n = 4$  and  $m = 8$  because the measures of each exterior angle of a square and a regular octagon are 90 degrees and 45 degrees, respectively. What is the greatest of all possible values of  $m$ ?  
(Ref Ref 1116: 2014 MathCounts)
5. Let  $b$  and  $c$  be two positive integers, and  $a$  be a prime number. If  $a^2 + b^2 = c^2$ , show that  $a < b$  and  $b + 1 = c$ .

(Ref Ref 157: 1982 Germany Olympiad)