Puzzle:
  Given two integers, x and y, where x+y is < or = 100 and where y>x>1 the following conversation takes place:
Paul (who knows the product of these two numbers): "I don't know the two numbers."
Jill (who knows the sum of these two numbers): "I already knew that you didn't know the numbers."
Paul: "Now I know the two numbers."
Jill: "Now I know them also."

Solution:
  x = 4 and y = 13 which creates a sum of 17 and a product of 52.
The reason for this is as follows; When Paul says that he doesn't know the two numbers that means that there are multiple possibilities after factoring his product.  52 can be factored as either (1*52), (2*26), or (4*13).
(1*52) is automatically eliminated because x has to be greater than 1.  But with two possibilities remaining Paul can rightfully say "I don't know the two numbers."  When Jill says, "I knew that you didn't know," this tells Paul that Jill's sum cannot be written as the sum of two primes.  This is because if Paul's number was the product of two primes then he would know what the number is.  Furthermore, because Goldbach's conjecture has proved that even numbers from 4 to 100 can be written as the sum of two primes the answer can't be (2*26) since 2 +26=28 which is an even number.  That is how Paul knows that the answer is (4*13), leading to his statement of, "Now I know the two numbers."  Jill can now figure out the answer for a few reasons.  First, as she knows the sum she knows that Paul's number must be either 30, 42, 52, 60, 66, 70, or 72.  Second, because Paul was able to figure out the answer she knows that the product must have factors such that when added are found to either be even or 17.  This eliminates 30, 42, 60, 66, 70, and 72 because if it was 30 it would leave the possibility of 11, if 42 would leave the possibility of 23, if 60 would leave the possibility of 23, if 66 would leave the possibility of 35, if 70 would leave the possibility of 37, and if 72 would leave the possibility of 27.  This tells Jill that Paul's product is 52 giving her the answer of (4*13).