Answer on Question #77033 – Math – Statistics and Probability

Question

A school principal and his wife as well as three other teachers are to be seated in a row so that the principal and his wife are next to each other. Find the number of ways this can be done.

Solution

The school principal and his wife and three other teachers can be seated in a row by several ways. The number of these ways is the number of permutations of 5 distinct objects. But in our case we have 4 distinct objects for permutation because the principal and his wife are next to each other, so the principal and his wife are considered as one distinct object. The number of permutations of n distinct objects is

$$P_n = n!.$$

So in our case

$$P_4 = 4! = 1 \cdot 2 \cdot 3 \cdot 4 = 24.$$

But the principal and his wife can be permuted by 2 (two) ways, because the number of permutations of 2 distinct objects is

$$P_2 = 2! = 1 \cdot 2 = 2.$$

Then use the multiplication rule. So in our case the number of all permutations is

$$P = P_4 \cdot P_2 = 24 \cdot 2 = 48.$$

Answer: 48.