An auto insurance company has 10,000 policyholders. Each policyholder is classified as
(i) young or old;
(ii) male or female; and
(iii) married or single.
Of these policyholders, 3000 are young, 4600 are male, and 7000 are married. The
policyholders can also be classified as 1320 young males, 3010 married males, and 1400
young married persons. Finally, 600 of the policyholders are young married males. How
many of the company’s policyholders are young, female, and single?

A. 280    B. 423    C. 486    D. 880    E. 896

Solution.
Let \( N(C) \) denote the number of policyholders in classification \( C \), where \( C \) can be any of
the classifications listed above. Then
\[
N(\text{Young } \cap \text{ Female } \cap \text{ Single}) = N(\text{Young } \cap \text{ Female}) - N(\text{Young } \cap \text{ Female } \cap \text{ Married}) =
\]
\[
= N(\text{Young}) - N(\text{Young } \cap \text{ Male}) - (N(\text{Young } \cap \text{ Married}) - N(\text{Young } \cap \text{ Male } \cap \text{ Married})) =
\]
\[
= 3000 - 1320 - (1400 - 600) = 880.
\]
Answer D.

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