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* State if each scenario involves a permutation or combination.

1. The batting order for seven players on a 12 person team.

$$\rightarrow \text{Permutation } ({}_{12}P_7)$$

2. Rob and Mary are planning trips to nine countries this year. There are 13 countries they would like to visit. They are deciding which countries to skip.

$$\rightarrow \text{Combination } ({}_{13}C_9)$$

3. There are 45 applicants for three Computer Programmer positions.

$$\rightarrow \text{Combination } ({}_{45}C_3)$$

* state if each scenario involves a permutation or combination. Then find the number of possibilities and provide solutions.

1. Combination $({}_{17}C_3)$ ${}_{17}C_3 = \frac{17!}{(17-3)!3!} = \frac{17 \cdot 16 \cdot 15 \cdot \cancel{14!}}{\cancel{14!} \cdot 3!} = \frac{4080}{6} = \boxed{680}$

2. Permutation $({}_{10}P_3)$ ${}_{10}P_3 = \frac{10!}{(10-3)!} = \frac{10 \cdot 9 \cdot 8 \cdot \cancel{7!}}{\cancel{7!}} = \boxed{720}$

3. Permutation $({}_{15}P_4)$ ${}_{15}P_4 = \frac{15!}{(15-4)!} = \frac{15 \cdot 14 \cdot 13 \cdot 12 \cdot \cancel{11!}}{\cancel{11!}} = \boxed{32,760}$

4. Combination $({}_{110}C_2)$ ${}_{110}C_2 = \frac{110!}{(110-2)!2!} = \frac{110 \cdot 109 \cdot \cancel{108!}}{\cancel{108!} \cdot 2!} = \frac{11,990}{2} = \boxed{5,995}$

5. Permutation $({}_{45}P_3)$ ${}_{45}P_3 = \frac{45!}{(45-3)!} = \frac{45 \cdot 44 \cdot 43 \cdot \cancel{42!}}{\cancel{42!}} = \boxed{85,140}$