

2.2**2:**

$$4 * 2 * 3 = 24$$

4:

$$\begin{aligned} 2 * {}_{18}C_9 &= 2 * \frac{18!}{9! * (18 - 9)!} \\ &= 2 * 48620 \\ &= 97240 \end{aligned}$$

6:

$$\begin{aligned} {}_{10}P_3 &= \frac{10!}{(10 - 3)!} \\ &= 720 \end{aligned}$$

10:

$$\begin{aligned} {}_{18}C_6 &= \frac{18!}{6! * (18 - 6)!} \\ &= 18564 \\ &\Rightarrow \\ {}_{18564}C_3 &= \frac{18564!}{3! * (18564 - 3)!} \\ &= 1066088460164 \end{aligned}$$

12:

$$\begin{aligned} {}_{12}C_2 &= 66 \\ {}_6C_2 &= 15 \\ {}_4C_2 &= 6 \\ P(\text{socks match}) &= \frac{15 + 6}{66} = \frac{1}{3} \end{aligned}$$