and chemestry books and 1 math volume.

Likewise $|P| = 4! \, 9!$, $|C| = 5! \, 8!$,

$|M \cap P| = 3! \, 4! \, 7!$, $|M \cap C| = 3! \, 5! \, 6!$

$|P \cap C| = 4! \, 5! \, 5!$ and $|M \cap P \cap C| = 3! \, 4! \, 5! \, 3!$

So the answer is

$$3! \, 10! + 4! \, 9! + 5! \, 8! - 3! \, 4! \, 7! - 3! \, 5! \, 6! - 4! \, 5! \, 5! +$$
$$+ \, 3! \, 4! \, 5! \, 3!$$

(7) Using the formula of Section    we get

$$8! - 4! \, 7! + 3! \, 6!$$

(8) $a_n = 2 a_{n-1} + (3^{n-1} - a_{n-1}) = a_{n-1} + 3^{n-1}$

(since there $3^{n-1}$ strings of length $n-1$). Also $a_1 = 2$.

Hence $a_n = 2 + 3 + \ldots + 3^{n-1} = 2 + \dfrac{3^n - 3}{2} = \dfrac{3^n + 1}{2}$

(9) Looking for particular solution in the form

$a_n = (An + B) 2^n$ we obtain $2A = 3A + 2$, $2B = 3B - 3A$

So that $A = -2$, $B = -6$. Hence the general solution

is $a_n = C \cdot 3^n - (2n + 6) 2^n$. Plugging $n = 0$ we get

$1 = C - 6$, so $C = 7$ and

$$a_n = 7 \cdot 3^n - (2n + 6) 2^n.$$