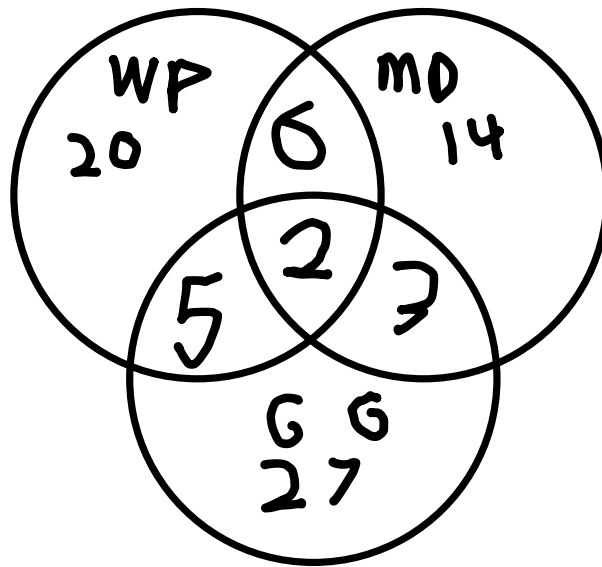


①



$$\text{total} = 20 + 14 + 27 - 6 - 5 - 3 + 2 = \boxed{49}$$

②

$$A = 1, 2, 3 = 101$$

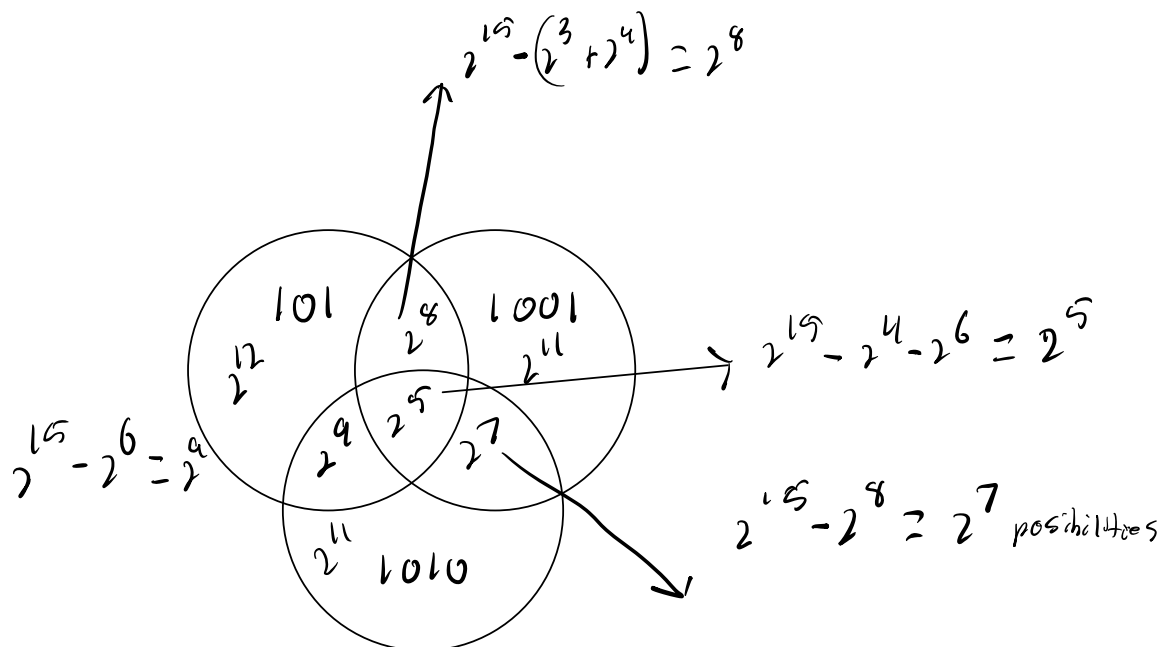
2^3 possibilities, 1

$$B = 12, 13, 14, 15 = 1001$$

2^4 pos 1

$$C = 3, 4, 5, 6 = 1010$$

2^4 1



$$2^{12} + 2^4 + 2^{11} - 2^9 - 2^8 - 2^7 + 2^5 \geq \boxed{7328}$$

3

$$\text{list } \{s^n, s^1, s^2, \dots, s^{742362}\}$$

$$\text{with in } 1 \leq x \leq y \leq 742362$$

such that their remainder s would be the same by mod 742361 , $a^x \equiv a^y \pmod{742361}$

4

$$3 \cdot \text{red} + 3 \cdot \text{blue} + 3 \cdot \text{yellow} + 2 \cdot \text{green} + 3 \cdot \text{white} + 1 = \boxed{16}$$

↑
would make 1 here
4 so must have at least 3

5

31 days till,

$$1 \leq t_1 < t_2 \dots < t_{n2} \leq 60$$

$$12 \leq t_1 + 11 \quad t_2 + 11 \quad < t_{n2} + 11 \leq 71$$

$$2 \text{ sets of } 60 = 120 \quad 1 \leq t \leq 71$$

PHP 71 piles with 120 things to put in them
2 numbers must be the same

⑥ 1 5 2 3 4 = 4! options for spots 2-5

$$\text{total} = 5 \cdot 4! - (P(5,3) \cdot 3!) + (P(5,2) \cdot 2!) - (P(5,1))$$

$$\downarrow 2 \quad - \quad - \quad - \quad 3!$$

$$2 \quad 3 \quad 3!$$

$$3 \quad 4 \quad 2!$$

$$4 \quad 5 \quad 1!$$