

① a) $A \cap B = \{e, u\}$

$C' = \{a, i, u\}$

$(A \cap B) \cup C' = \{a, e, i, u\}$

b) $\phi, \{e\}, \{o\}, \{e, o\}$

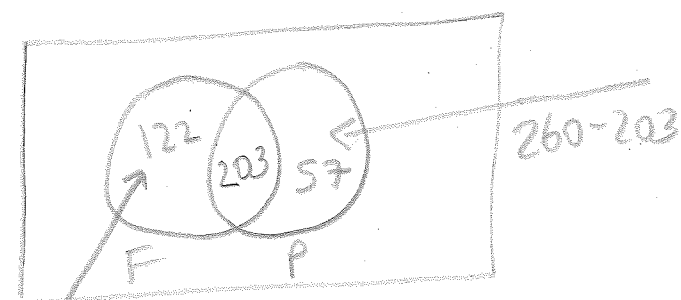
② Let F = full-time
 P = permanent

$n(F \cup P) = n(F) + n(P) - n(F \cap P)$

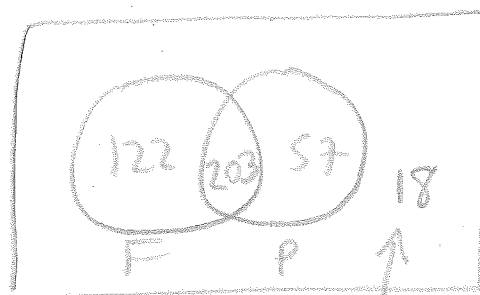
$382 = 325 + 260 - n(F \cap P)$

$-203 = -n(F \cap P)$

$203 = n(F \cap P)$

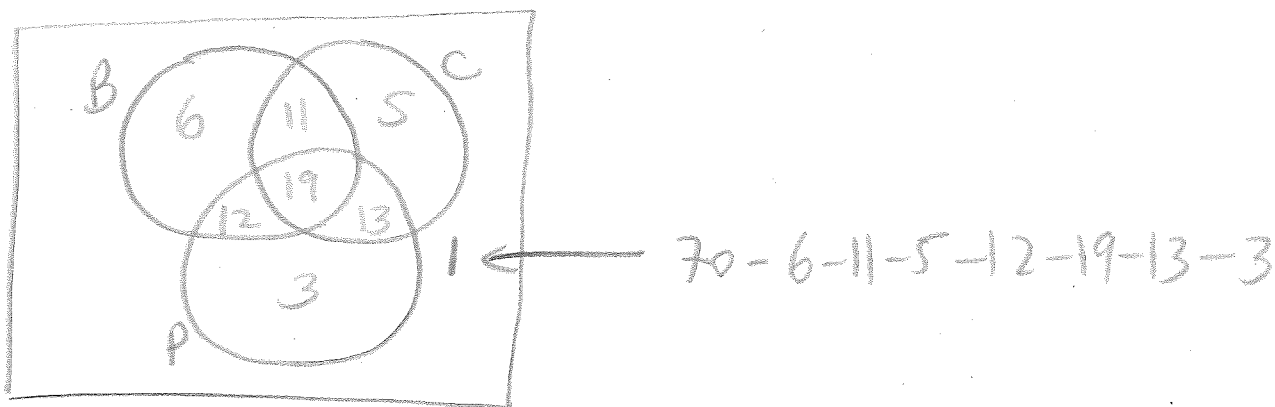
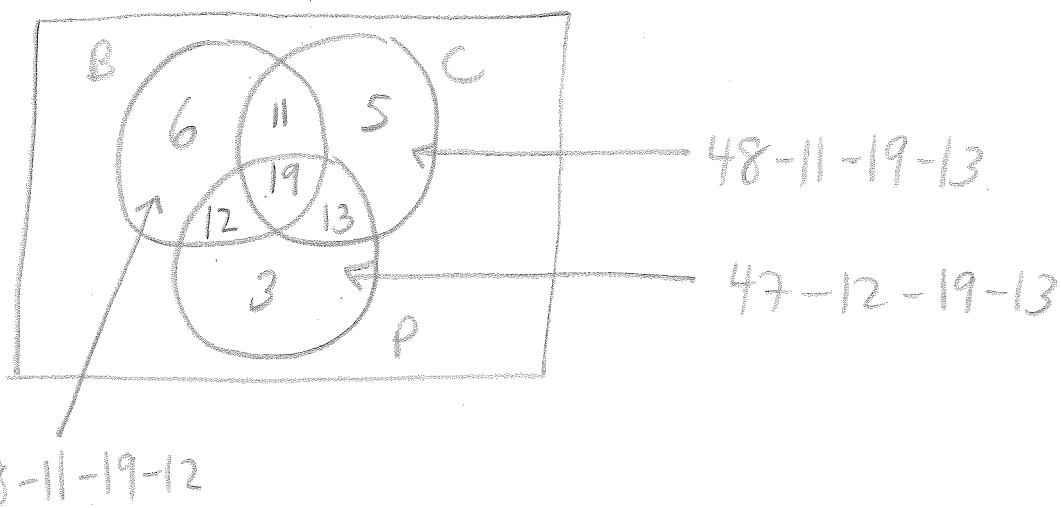
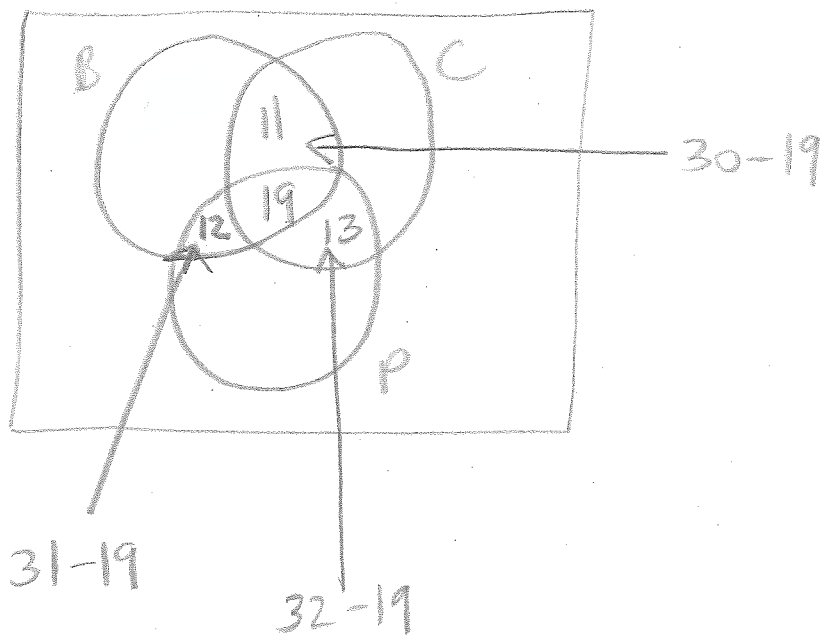


$325 - 203$



$400 - 122 - 203 - 57$

③ Let $B = \text{taking biology}$
 $C = \text{" chemistry}$
 $P = \text{" physics}$



④ a) $\boxed{5} \times \boxed{5} \times \boxed{5} \times \boxed{5}$

of options for 1st letter 2nd letter 3rd letter 4th letter

$= 625$

b) $\boxed{5} \times \boxed{4} \times \boxed{3} \times \boxed{2}$

of options for 1st letter 2nd letter 3rd letter 4th letter

$= 120$

Alternatively: $P(5, 4) = 120$

c) $\boxed{5} \times \boxed{5} \times \boxed{5} \times \boxed{1}$

of options for 1st letter 2nd letter 3rd letter 4th letter (forced)

$= 125$

⑤ These selections are unordered, since there is no mention of order.

a) $13 + 13 = 26$ red cards

$$C(26, 4) = 14950$$

b) 13 hearts

$$C(13, 4) = 715$$

c) $4 + 4 = 8$ aces or kings

$$C(8, 4) = 70$$

d) 4 aces

$$C(4, 4) = 1$$

⑥ Let $W = \text{white}$
 $B = \text{black}$

10 W	12 B
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22 total

(Total # of outcomes) - (# of undesirable outcomes)

$$= \boxed{C(22, 6)} - \boxed{C(12, 0) \times C(10, 6)} - \boxed{C(12, 1) \times C(10, 5)}$$

of ways
to choose 6
balls from 22

0 B
and 6 W

1 B
and 5 W

$$= 74613 - 1 \times 210 - 12 \times 252$$

$$= 71379$$