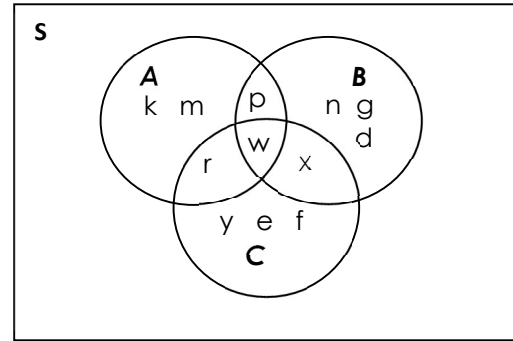


1. For the given Venn diagram, find the following:

- a)  $n(B \cup C)$  10
- b)  $n(B \cap C) \cup A$  6
- c)  $n(C^c)$  6
- d)  $n(A \cap B)^c$  10



[4 marks]

1. Given  $S = \{\text{letters in METAPHORIC}\}$ ,  $A = \{\text{vowels in CHOIR}\}$ ,  $B = \{\text{letters in HAT}\}$ ,  $C = \{\text{consonants in TAPE}\}$ 

Determine:

- a)  $A^c$   $\{\text{M, E, T, A, P, H, R, C}\}$
- b)  $(B \cap C)$   $\{\text{T}\}$
- c)  $(A \cup B \cup C)$   $\{\text{O, I, H, A, T, P}\}$
- d)  $S^c$   $\{\emptyset\}$

$$S = \{\text{M, E, T, A, P, H, O, R, I, C}\}$$

$$A = \{\text{O, I}\}$$

$$C = \{\text{T, P}\}$$

$$B = \{\text{H, A, T}\}$$

[4 marks]

2. Shade in the appropriate regions for each of the following Venn Diagrams:

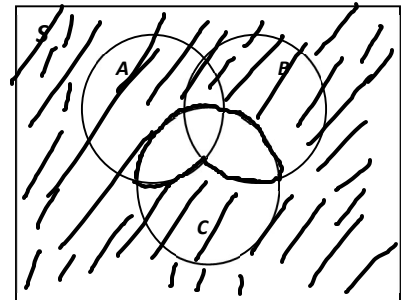
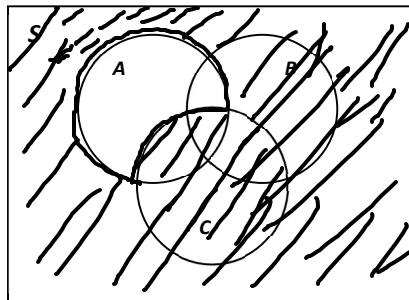
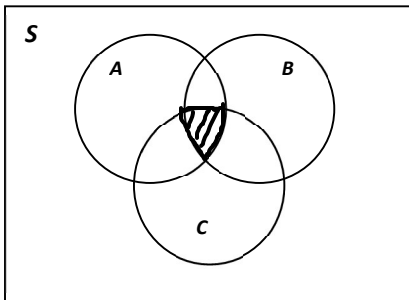
[3 marks]

3.

a)  $(A \cap B) \cap C$

b)  $A^c \cup C$

c)  $(A \cup B \cap C)^c$

4. If  $n(S) = 35$ ,  $n(A) = 21$ ,  $n(B) = 12$  and  $n(A \cap B) = 6$  determine:

[3 marks]

a)  $n(A^c)$

b)  $n(A \cup B)$  [show general equation for full marks for (b)]

$$n(A^c) = n(S) - n(A)$$

$$= 35 - 21$$

$$= 14$$

$$\therefore n(A^c) = 14$$

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

$$= 21 + 12 - 6$$

$$= 27$$

$$\therefore n(A \cup B) = 27$$

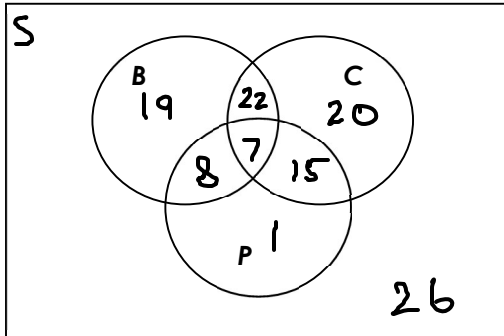
5. There are 118 grade 12 students at Northern. Of these students, 56 have signed up for biology, 64 for chemistry, and 31 for physics. This includes 29 students who ~~are~~ taking both biology and chemistry, 22 who are taking chemistry and physics, and 15 who are taking biology and physics. There are 7 students who have signed up for all three science courses.

[3 marks]

a) complete the following Venn diagram

b) How many students are NOT taking science? 26

$$n(S) = 118$$



$$n(\text{only } B) = 56 - 22 - 7 - 8 = 19$$

$$n(\text{only } C) = 64 - 22 - 7 - 15 = 20$$

$$n(\text{only } P) = 31 - 8 - 7 - 15 = 1$$

$$n((B \cup C \cup P)^c)$$

$$= n(S) - n(B \cup C \cup P)$$

$$= 118 - (19 + 22 + 20 + 7 + 15 + 8 + 1)$$

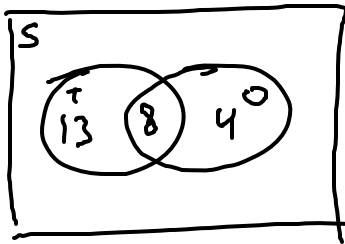
$$= 118 - 92$$

$$= 26$$

∴ 26 grade 12 Northern students are not taking science

6. Everyone in the room watches The Mandalorian. 21 of them watch it on TV, 12 watch it online, 8 of them watch it on TV and online. How many people are in the room? There is more than one method to solve this problem – you only need to choose one. Full work must be shown for full marks, regardless of the method chosen.

[3 marks]



Let  $T$  be the set of people in the room who watch The Mandalorian on TV.

Let  $O$  be the set of people in the room who watch The Mandalorian online.

$$n(T \cup O) = n(T) + n(O) - n(T \cap O)$$

$$= 21 + 12 - 8$$

$$= 25$$

$$\therefore n(T \cup O) = 25$$

∴ There are 25 people in the room.