

Class: Nine Date: \_\_\_\_\_ Name: \_\_\_\_\_

Subject- Mathematics

Source: photo of exercise are given below.

Set

b)  $P \cap Q = \{3, 5, 7\}$   
 $P \cap Q \cap R = \{3, 5\}$

c)  $P \cap Q = \{3, 5, 7\}$   
 $(P \cap Q) \cup R = \{1, 2, 3, 4, 5, 7\}$

d)  $P \cup Q = \{1, 2, 3, 5, 7, 9, 11\}$   
 $(P \cup Q) \cap R = \{1, 2, 3, 5\}$   
 $(P \cup Q) \cap \bar{R} = \{4, 6, 7, 8, 9, 10, 11, 12\}$

**EXERCISE 1.1**

**General section**

1. Let A and B be the subsets of a universal set U. Define the following set operations in set-builder forms.

- a)  $A - B$       b)  $A \cap B$       c)  $\overline{B - A}$       d)  $A \cup B$       e)  $\overline{A - B}$
- f)  $\overline{A \cup B}$       g)  $B - A$       h)  $\overline{A}$       i)  $\overline{B}$       j)  $\overline{A \cap B}$

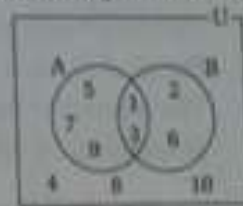
2. Let P and Q are the subsets of a universal set U. Write the set operations defined by the following set-builder forms.

- a)  $\{x : x \in Q, \text{ but } x \notin P\}$       b)  $\{x : x \in U, \text{ but } x \notin Q\}$       c)  $\{x : x \in P \text{ or } x \in Q\}$
- d)  $\{x : x \in U, \text{ but } x \notin P \text{ or } x \notin Q\}$       e)  $\{x : x \in P, \text{ but } x \notin Q\}$       f)  $\{x : x \in P \text{ and } x \in Q\}$
- g)  $\{x : x \in U, \text{ but } x \notin P - Q\}$       h)  $\{x : x \in U, \text{ but } x \notin P \text{ and } x \notin Q\}$
- i)  $\{x : x \in U, \text{ but } x \notin P\}$

3. Write the set operations represented by shaded regions shown in the following Venn-diagrams.

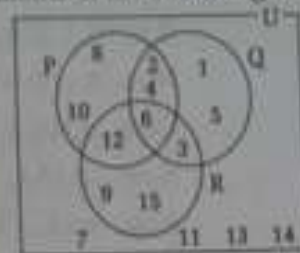
4. a) A and B are the subsets of the universal set U. From the given diagrams, list the elements of the following set operations.

(i)  $A \cup B$  and  $\overline{A \cup B}$       (ii)  $A \cap B$  and  $\overline{A \cap B}$   
 (iii)  $A - B$  and  $\overline{A - B}$       (iv)  $B - A$  and  $\overline{B - A}$



- b) P, Q and R are the subsets of the universal set U. List the elements of the following set operations from the given diagram.

(i)  $P \cup Q \cup R$       (ii)  $P \cap Q \cap R$       (iii)  $\overline{P \cup Q \cup R}$   
 (iv)  $\overline{P \cap Q \cap R}$       (v)  $(P \cup Q) \cap R$       (vi)  $(P \cap Q) \cup R$



5. a) Assuming that A and B are two overlapping sets, draw two separate Venn-diagrams to verify  $A \cup B = B \cup (A - B)$  by shading.  
 b) Let P and Q are two overlapping sets. Draw two separate Venn-diagrams of  $P \cup (Q - P)$  and  $P \cup Q$  and verify  $P \cup (Q - P) = P \cup Q$  by shading.

### Creative section - A

6. P and Q are the subsets of the universal set U. If  $U = \{1, 2, 3, \dots, 10\}$ ,  $P = \{1, 2, 3, 4, 5\}$  and  $Q = \{2, 4, 6, 8\}$ , list the elements of the following set operations and represent them by shading in Venn-diagrams.

a)  $P \cup Q$  and  $\overline{P \cup Q}$       b)  $P \cap Q$  and  $\overline{P \cap Q}$       c)  $P - Q$  and  $\overline{P - Q}$   
 d)  $Q - P$  and  $\overline{Q - P}$       e)  $\overline{P \cup Q}$       f)  $P \cap Q$

7.  $A = \{1, 3, 5, 7, 9, 11\}$ ,  $B = \{1, 2, 3, 4, 5, 6, 7\}$  and  $C = \{3, 6, 9, 12, 15\}$  are the subsets of the universal set  $U = \{1, 2, 3, \dots, 15\}$ . List the elements of the following set operations and illustrate them in Venn-diagrams by shading.

a)  $A \cup B \cup C$  and  $\overline{A \cup B \cup C}$       b)  $A \cap B \cap C$  and  $\overline{A \cap B \cap C}$   
 c)  $(A \cup B) \cap C$  and  $\overline{(A \cup B) \cap C}$       d)  $A \cap (B \cup C)$  and  $\overline{A \cap (B \cup C)}$   
 e)  $(A - B) \cup C$  and  $\overline{(A - B) \cup C}$       f)  $A \cup (B - C)$  and  $\overline{A \cup (B - C)}$

### Creative section - B

8. If  $U = \{1, 2, 3, \dots, 12\}$ ,  $P = \{1, 2, 3, 4, 5, 6\}$ ,  $Q = \{2, 4, 6, 8\}$  and  $R = \{3, 6, 9, 12\}$ , verify the following operations.

a)  $P \cup (Q \cap R) = (P \cup Q) \cap (P \cup R)$       b)  $P \cap (Q \cup R) = (P \cap Q) \cup (P \cap R)$   
 c)  $\overline{P \cup Q} = \overline{P} \cap \overline{Q}$       d)  $\overline{P \cap Q \cap R} = \overline{P} \cup \overline{Q} \cup \overline{R}$

9. a) If  $A = \{2, 4, 6, 8, 10\}$  and  $B = \{1, 3, 5, 7, 9\}$  are two disjoint sets verify that  $n(A \cup B) = n(A) + n(B)$ .  
 b) If  $A = \{2, 3, 5, 7\}$  and  $B = \{1, 2, 3, 4, 6, 12\}$  are two overlapping sets, show that  $n(A \cup B) = n(A) + n(B) - n(A \cap B)$ .

### 1.9 Cardinality relationships of two sets

The cardinality of a set is a measure of the number of members of the set. For example, the set  $A = \{1, 3, 5, 7, 9\}$  contains 5 members, and therefore  $A$  has a cardinality of 5. The number of members of a set is called its cardinality. Certain relationships can be generalised by taking the cardinalities of different sets.

#### (i) Cardinality relations of union of two disjoint sets

Let  $U = \{a, b, c, d, e, f, g, h, i, j\}$  is a universal set.  $A = \{a, b, c, d\}$  and  $B = \{e, f, g, h, i\}$  are the subsets of  $U$ .

Now,  $A \cup B = \{a, b, c, d, e, f, g, h, i\}$   
Here,  $n(U) = 10$ ,  $n(A) = 4$  and  $n(B) = 5$

Now,  $n(A \cup B) = 9 = 4 + 5 = n(A) + n(B)$

Also,  $n(\overline{A \cup B}) = 1 = 10 - 9 = n(U) - n(A \cup B)$

Thus, if  $A$  and  $B$  are any two disjoint subsets of a universal set  $U$ , then

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

$$n(\overline{A \cup B}) = n(U) - n(A \cup B)$$



#### (ii) Cardinality relations of union of two overlapping sets

Let  $A = \{a, b, c, d, e\}$  and  $B = \{c, h, i, e, f\}$  are two subsets of a universal set  $U = \{a, b, c, d, e, f, g, h, i, j\}$

Now,  $A \cup B = \{a, b, c, d, e, f, h, i\}$

$$A \cap B = \{c, e\}$$

$$\overline{A \cup B} = \{g, j\}$$

$$\text{only } A = n_o(A) = \{a, b, d\}$$

$$\text{only } B = n_o(B) = \{f, h, i\}$$

Here,  $n(U) = 10$ ,  $n(A) = 5$ ,  $n(B) = 5$  and  $n(A \cap B) = 2$

Now,  $n(A \cup B) = 8 = 5 + 5 - 2 = n(A) + n(B) - n(A \cap B)$

Also,  $n(\overline{A \cup B}) = 2 = 10 - 8 = n(U) - n(A \cup B)$

Again,  $n(\text{only } A) = n_o(A) = 3 = 5 - 2 = n(A) - n(A \cap B)$

$n(\text{only } B) = n_o(B) = 3 = 5 - 2 = n(B) - n(A \cap B)$

Thus, if  $A$  and  $B$  are any two overlapping subsets of a universal set  $U$ ,

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

$$n(\overline{A \cup B}) = n(U) - n(A \cup B)$$

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

$$n(\text{only } A) = n_o(A) = n(A) - n(A \cap B)$$

$$n(\text{only } B) = n_o(B) = n(B) - n(A \cap B)$$

Furthermore, if the universal set  $U$  contains only the members of  $A$  and  $B$ , then,  $n(\overline{A \cup B}) = 0$  and  $n(U) = n(A \cup B)$



Work: complete 1.1

Do your work neatly

**Subject – English**

Unit 3 class 9 E book

Grammar Practice

Study Time

## विषय - नेपाली

१ कुनै एक अनुच्छेदबाट मुख्य चार बुँदा टिपी सारांस लेख्नुहोस्।  
२ कुनै एक शीर्षकमा कथा लेख्नुहोस्।

### **Subject- Science**

1. What is the cause of chemical reaction? How does Magnesium and oxygen combine in the form of MgO molecule?
2. Explain the electron losing and gaining process by an atom from its valence shell with taking one/one examples of metal and non-metal.
3. Draw the diagram of NaCl molecule by showing its ionic (electrovalent) bond.
4. Distinguish between Na atom and Na<sup>+</sup> ion in terms of their charge and number of electrons.

**The End.**