

### EXERCISE 13D

1. If  $A = \{4, 5, 6, 7, 8\}$  and  $B = \{6, 8, 10, 12\}$ , find :

(i)  $A \cup B$

(ii)  $A \cap B$

(iii)  $A - B$

(iv)  $B - A$

**Solution:**

(i)  $A \cup B$

We know that

$$A \cup B = \{\text{All the elements from set A and all the elements from set B}\} = \{4, 5, 6, 7, 8, 10, 12\}$$

(ii)  $A \cap B$

We know that

$$A \cap B = \{\text{Elements which are common to both the sets A and B}\} = \{6, 8\}$$

(iii)  $A - B$

We know that

$$A - B = \{\text{Elements of set A which are not in set B}\} = \{4, 5, 7\}$$

(iv)  $B - A$

We know that

$$B - A = \{\text{Elements of set B which are not in set A}\} = \{10, 12\}$$

2. If  $A = \{3, 5, 7, 9, 11\}$  and  $B = \{4, 7, 10\}$ , find:

(i)  $n(A)$

(ii)  $n(B)$

(iii)  $A \cup B$  and  $n(A \cup B)$

(iv)  $A \cap B$  and  $n(A \cap B)$

**Solution:**

$$(i) n(A) = \{3, 5, 7, 9, 11\} = 5$$

$$(ii) n(B) = \{4, 7, 10\} = 3$$

$$(iii) A \cup B = \{3, 4, 5, 7, 9, 10, 11\}$$

$$n(A \cup B) = 7$$

$$(iv) A \cap B = \{7\}$$

$$n(A \cap B) = 1$$

3. If  $A = \{2, 4, 6, 8\}$  and  $B = \{3, 6, 9, 12\}$ , find:

(i)  $(A \cap B)$  and  $n(A \cap B)$

(ii)  $(A - B)$  and  $n(A - B)$

(iii)  $n(B)$

**Solution:**

$$(i) (A \cap B) = \{6\}$$

$$n(A \cap B) = 1$$

(ii)  $(A - B) = \{2, 4, 8\}$   
 $n(A - B) = 3$

(iii)  $n(B) = \{3, 6, 9, 12\} = 4$

4. If  $P = \{x : x \text{ is a factor of } 12\}$  and  $Q = \{x : x \text{ is a factor of } 16\}$ , find :

(i)  $n(P)$

(ii)  $n(Q)$

(iii)  $Q - P$  and  $n(Q - P)$

**Solution:**

(i)  $n(P) = \text{Factors of } 12 = 1, 2, 3, 4, 6, 12$   
 $n(P) = 6$

(ii)  $n(Q) = \text{Factors of } 16 = 1, 2, 4, 8, 16$   
 $n(Q) = 5$

(iii)  $Q - P$  and  $n(Q - P)$

We know that

Elements of set  $P = \{1, 2, 3, 4, 6, 12\}$

Elements of set  $Q = \{1, 2, 4, 8, 16\}$

So we get

$Q - P = 8, 16$

$n(Q - P) = 2$

5.  $M = \{x : x \text{ is a natural number between } 0 \text{ and } 8\}$  and  $N = \{x : x \text{ is a natural number from } 5 \text{ to } 10\}$ . Find:

(i)  $M - N$  and  $n(M - N)$

(ii)  $N - M$  and  $n(N - M)$

**Solution:**

We know that

Natural numbers between 0 and 8  $M = \{0, 1, 2, 3, 4, 5, 6, 7\}$

Natural numbers between 5 and 10  $N = \{6, 7, 8, 9, 10\}$

(i)  $M - N = \{1, 2, 3, 4\}$   
 $n(M - N) = 4$

(ii)  $N - M = \{8, 9, 10\}$   
 $n(N - M) = 3$

6. If  $A = \{x : x \text{ is natural number divisible by } 2 \text{ and } x < 16\}$  and  $B = \{x : x \text{ is a whole number divisible by } 3 \text{ and } x < 18\}$ , find :

(i)  $n(A)$

(ii)  $n(B)$

(iii)  $A \cap B$  and  $n(A \cap B)$

(iv)  $n(A - B)$

**Solution:**

It is given that

$A = \{x : x \text{ is natural number divisible by } 2 \text{ and } x < 16\} = \{2, 4, 6, 8, 10, 12, 14\}$

$$B = \{x: x \text{ is a whole number divisible by 3 and } x < 18\} = \{3, 6, 9, 12, 15, 18\}$$

(i)  $n(A) = 7$

(ii)  $n(B) = 6$

(iii)  $A \cap B = \{2, 4, 6, 8, 10, 12, 14\} \cap \{3, 6, 9, 12, 15, 18\} = \{6, 12\}$   
 $n(A \cap B) = 2$

(iv) We know that

$$A - B = \{2, 4, 6, 8, 10, 12, 14\} - \{3, 6, 9, 12, 15, 18\} = \{2, 4, 8, 10, 14\}$$
$$n(A - B) = 5$$

**7. Let A and B be two sets such that  $n(A) = 75$ ,  $n(B) = 65$  and  $n(A \cap B) = 45$ , find :**

**(i)  $n(A \cup B)$**

**(ii)  $n(A - B)$**

**(iii)  $n(B - A)$**

**Solution:**

It is given that

$$n(A) = 75, n(B) = 65 \text{ and } n(A \cap B) = 45$$

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

Substituting the values

$$n(A \cup B) = 75 + 65 - 45$$

So we get

$$n(A \cup B) = 95$$

(ii)  $n(A - B) = n(A) - n(A \cap B)$

Substituting the values

$$n(A - B) = 75 - 45$$

So we get

$$n(A - B) = 30$$

(iii)  $n(B - A) = n(B) - n(A \cap B)$

Substituting the values

$$n(B - A) = 65 - 45$$

So we get

$$n(B - A) = 20$$

**8. Let A and B be two sets such that  $n(A) = 45$ ,  $n(B) = 38$  and  $n(A \cup B) = 70$ , find :**

**(i)  $n(A \cap B)$**

**(ii)  $n(A - B)$**

**(iii)  $n(B - A)$**

**Solution:**

It is given that

$$n(A) = 45, n(B) = 38 \text{ and } n(A \cup B) = 70$$

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

Substituting the values  
 $n(A \cap B) = 45 + 38 - 70$   
So we get  
 $n(A \cap B) = 13$

(ii)  $n(A - B) = n(A \cup B) - n(B)$   
Substituting the values  
 $n(A - B) = 70 - 38$   
So we get  
 $n(A - B) = 32$

(iii)  $n(B - A) = n(A \cup B) - n(A)$   
Substituting the values  
 $n(B - A) = 70 - 45$   
So we get  
 $n(B - A) = 25$

**9. Let  $n(A) = 30$ ,  $n(B) = 27$  and  $n(A \cup B) = 45$ , find :**

**(i)  $n(A \cap B)$**

**(ii)  $n(A - B)$**

**Solution:**

It is given that  
 $n(A) = 30$ ,  $n(B) = 27$  and  $n(A \cup B) = 45$

(i)  $n(A \cap B) = n(A) + n(B) - n(A \cup B)$   
Substituting the values  
 $n(A \cap B) = 30 + 27 - 45$   
So we get  
 $n(A \cap B) = 12$

(ii)  $n(A - B) = n(A \cup B) - n(B)$   
Substituting the values  
 $n(A - B) = 45 - 27$   
So we get  
 $n(A - B) = 18$

**10. Let  $n(A) = 31$ ,  $n(B) = 20$  and  $n(A \cap B) = 6$ , find:**

**(i)  $n(A - B)$**

**(ii)  $n(B - A)$**

**(iii)  $n(A \cup B)$**

**Solution:**

It is given that  
 $n(A) = 31$ ,  $n(B) = 20$  and  $n(A \cap B) = 6$

(i)  $n(A - B) = n(A) - n(A \cap B)$   
Substituting the values  
 $n(A - B) = 31 - 6$   
So we get

$$n(A-B) = 25$$

$$(ii) n(B - A) = n(B) - n(A \cap B)$$

Substituting the values

$$n(B - A) = 20 - 6$$

So we get

$$n(B - A) = 14$$

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

Substituting the values

$$n(A \cup B) = 31 + 20 - 6$$

So we get

$$n(A \cup B) = 45$$



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