CHAPTER-1
SET

SOLVED EXERCISE 1.1

Q.1: Write the following sets in descriptive form.

(i) $A = \{a, e, i, o, u\}$

Solution:

A is the set of vowels of the English alphabet.

(ii) $B = \{3, 6, 9, 12, ...\}$

Solution:

B is the set of multiples of 3.

(iii) $C = \{s, p, r, i, n, g\}$

Solution:

C is the set of letters of the word spring.

(iv) $D = \{a, b, c, ..., z\}$

Solution:

D is the set of small letters of the English alphabet.

(v) $E = \{6, 7, 8, 9, 10\}$

Solution:

E is the set of natural numbers from 6 to 10.

(vi) $F = \{0, \pm 1, \pm 2\}$

Solution:

F is the set of integers from -2 to 2.

(vii) $G = \{x | x \ N \wedge x < 3\}$

Solution:

G is the set of natural numbers less than 3.

(viii) $H = \{x | x \ N \wedge x > 99\}$

Solution:

H is the set of natural numbers greater than 99.

Q.2: Write the following sets in tabular form.

(i) A = Letters of the word hockey.

Solution:

$A = \{h, o, c, k, e, y\}$

(ii) B = Two colours in the rainbow.

Solution:

B = {blue, red}

(iii) C = Numbers less than 18 and divisible by 3

Solution:

$C = \{3, 6, 9, 12, 15\}$

(iv) **D = Multiples of 5 less than 30**

Solution:

D = {5, 10, 15, 20, 25}

(v) **E = {x|x ∈ W ∧ x > 5}**

Solution:

E = {6, 7, 8, 9, ...}

(vi) **F = {x|x ∈Z∧ −7 < x < − 1}**

Solution:

F = {−6, −5, −4, −3, −2}

Q.3: Write the following sets into the set builder form.

(i) **A = {1, 2, 3, 4, 5}**

Solution:

A = {x|x ∈ N ∧ x < 6}

(ii) **B = {2, 3, 5, 7}**

Solution:

B = {x|x is a prime number < 11}

(iii) **N = Set of natural numbers**

Solution:

N = {x|x is a natural number}

(iv) **W = Set of whole numbers**

Solution:

W = {x|x is a whole number}

(v) **Z = Set of all integers**

Solution:

Z = {x|x is an integer}

(vi) **L = {5, 10, 15, 20, ...}**

Solution:

L = {x|x is a natural number multiple of 5}

(vii) **E = Set of even numbers between 1 and 10.**

Solution:

E = {x|x is an even number ∧ 1 < x < 10}

(viii) **O = Set of odd numbers greater than 15**

Solution:

O= {x|x is an odd number ∧ x > 15}

(ix) **C = Set of planets in the solar system.**

Solution:

C = {x|x is a planet of the solar system}

(x) **S = set of two colours in the rainbow.**

Solution:

S={x|x are any two colors in the rainbow}

SOLVED EXERCISE 1.2

Q.1: Find the union of the following sets.

(i) $A = \{1, 3, 5\}$, $B = \{1, 2, 3, 4\}$

Solution:

$A \cup B = \{1,3,5\} \cup \{1,2,3,4\} = \{1,2,3,4,5\}$

(ii) $S = \{a, b, c\}$, $T = \{c, d, e\}$

Solution:

$S \cup T = \{a,b,c\} \cup \{c,d,e\} = \{a, b, c, d, e\}$

(iii) $X = \{2, 4, 6, 8, 10\}$, $Y = \{1, 5, 10\}$

Solution:

$X \cup Y = \{2,4,6,8,10\} \cup \{1,5,10\} = \{1, 2, 4, 5, 6, 8, 10\}$

(iv) $C = \{i, o, u]$, $D = \{a, e, o\}$, $E = \{i, e, u\}$

Solution:

$C \cup D = \{i,o,u\} \cup \{a,e,o\} = \{a,e,i,o,u\}$

$C \cup D \cup E = \{a,e,i,o,u\} \cup \{i,e,u\} = \{a,e,i,o,u\}$

(v) $L = \{3, 6, 9, 12\}$, $M = \{6, 12, 18, 24\}$, $N = \{4, 8, 12, I6\}$

Solution:

$L \cup M = \{3,6,9,12\} \cup \{6,12,18,24\} = \{3,6,9,12,18,24\}$

$L \cup M \cup N = \{3,6,9,12,18,24\} \cup \{4,8,12,16\} = \{3,4,6,8,9,12,16,18,24\}$

Q.2: Find the intersection of the following sets.

(i) $P = \{0, 1, 2, 3\}$, $Q = \{-3, -2, -1, 0\}$

Solution:

$P \cap Q = \{0, 1, 2, 3\} \cap \{-3, -2, -1, 0\} = \{0\}$

(ii) $M = \{1, 2, \ldots, 10\}$, $N = \{1, 3, 5, 7, 9\}$

Solution:

$M \cap N = \{1, 2, \ldots, 10\} \cap \{1, 3, 5, 7, 9\} = \{1, 3, 5, 7, 9\}$

(iii) $A = \{3, 6, 9, 12, 15\}$, $B = \{5, 10, 15, 20\}$

Solution:

$A \cap B = \{3, 6, 9, 12, 15\} \cap \{5, 10, 15, 20\} = \{15\}$

(iv) $U = \{-1, -2, -3\}$, $V = \{1, 2, 3\}$, $W = \{0, \pm 1, \pm 2\}$

Solution:

$V \cap W = \{1,2,3\} \cap \{0,\pm1,\pm2\} = \{1,2\}$

$U \cap V \cap W = \{-1,-2,-3\} \cap \{1,2\} = \{\}$

(v) $X = \{a, l, m]$, $Y = \{i, s, l, a, m\}$, $Z = \{l, i, o, n\}$

Solution:

$X \cap Y = \{a, \ell, m\} \cap \{i, s, \ell, a, m\} = \{a, \ell, m\}$

$X \cap Y \cap Z = \{a, \ell, m\} \cap \{\ell, i, o, n\} = \{\ell\}$

3. **If N = set of natural numbers and W = Set of whole numbers, then find NUW and N∩W.**

Solution:

N = {1, 2, 3, ...}, W = {0, 1, 2, 3, ...}

NUW = {1, 2, 3, ...}U{0, 1, 2, 3,...}

= {0, 1, 2, 3, ...} = W

= N U W = W

N∩W = {1, 2, 3, ...}∩ {0, 1, 2, 3...}

= {1, 2, 3, ...} = N

= N ∩ W = N.

4. **If P = set of prime numbers and C = set of composite numbers, then find P U C and P ∩ C.**

Solution:

P = {2, 3, 5, 7, 11, ...}, C = {4, 6,8, ...}

PUC = {2, 3, 5, 7, 11,...} U{4, 6,8, ...} = {2, 3,4, ...}

P∩C = {2, 3, 5, 7, 11, ...} ∩{4, 6,8, ...} = {}

5. **If A= {a, c, d, f}, B = {b, c, f, g} and C = (c, f, g, h}, then find**

(i) AU (B U C) (ii) A ∩ (B ∩ C)

Solution: (i) AU (B U C)

BUC = {b, c, f, g} U{c, f, g, h} = {b, c, f, g, h}

AU(BUC) = {a, c, d, f}U{b, c, f, g, h} = {a, b, c, d, f, g, h}

Solution: (ii) A ∩ (B ∩ C)

B ∩ C = {b, c, f, g} ∩ {c, f, g, h} = {c, f, g}

A ∩ (B ∩ C) = {a, c, d, f} ∩ {c, f, g} = {c, f}

6. **If X = {1, 2, 3,...,10}, Y = {2, 4, 6, 8, 12} and Z = {2, 3, 5, 7, 11} then find**

(i) X U (Y U Z) (ii) X ∩ (Y ∩ Z)

Solution: (i) X U (Y U Z)

Y U Z = {2, 4, 6, 8, 12}U {2, 3, 5, 7, 11} = {2, 3, 4, 5, 6, 7, 8, 11, 12}

X U (Y U Z) = {1, 2, 3,..., 10}U {2,3, 4,5, 6,7, 8, 11, 12} = {1, 2, 3, ..., 12}

Solution: (ii) X ∩ (Y ∩ Z)

Y ∩ Z = {2, 4, 6, 8, 12}U {2, 3, 5, 7, 11} = {2}

X∩ (Y ∩ Z) = {1, 2, 3,..., 10}∩{2} = {2}

7. **If R = {0, 1, 2 3}, S = {0, 2, 4} and T = {1, 2, 3, 4} then find**

(i) R \ S (ii) T \ S (iii) R \ T (iv) S \ R

Solution:

(i) R \ S = R − S = {0, 1, 2, 3} − {0, 2, 4} = {1, 3}

(ii) T \ S = T − S = {1, 2, 3, 4} − {0, 2, 4} = {1, 3}

(iii) R \ T = R − T = {0, 1, 2, 3} − {1, 2, 3, 4} = {0}

(iv) S \ R = S − R = {0, 2, 4} − {0, 1, 2, 3} = {4}

SOLVED EXERCISE 1.3

1. **Look at each pair of sets to separate the disjoint and overlapping sets.**

(i) A = {a, b, c, d, e}, B = {d, e, f, g, h}
(ii) L = {2, 4, 6, 8, 10), M = (3, 6, 9, 12}
(iii) P = set of prime numbers, C = set of composite numbers
(iv) E = set of even numbers, O = set of odd numbers

Solution:

(i) and (ii) are overlapping sets
(iii) and (iv) are disjoint sets

2. **If U = {l, 2, 3,...,10}, A = {l, 2, 3, 4, 5}, B = {l, 3, 5, 7, 9}, C = {2, 4, 6, 8, 10} and D = {3, 4, 5, 6, 7}, then find:**

(i) A' **(ii) B'** **(iii) C'** **(iv) D'**

Solution:

(i) A' = U – A = {1, 2, 3,...,10} – {1, 2, 3, 4, 5} = {6, 7, 8, 9, 10}
(ii) B' = U – B = {1, 2, 3,...,10} – {1, 3, 5, 7, 9} = {2, 4, 6, 8, 10}
(iii) C' = U – C = {1, 2, 3,...,10} – {2, 4, 6, 8, 10} = {1, 3, 5, 7, 9}
(iv) D' = U – D = {1, 2, 3,...,10} – {3, 4, 5, 6, 7} = {1, 2, 8, 9, 10}

3. **If U = {a, b, c, ..., i}, X = {a, c, e, g, i], Y = {a, e, i} and Z = {a, g, h}, then find:**

(i) X′ **(ii) Y′** **(iii) Z′** **(iv) U′**

Solution:

(ii) (i) X′ = U – X = {a, b, c, ...,i} – {a, c, e, g, i} = {b, d, f, h}
(iii) (ii) Y′ = U – Y = {a, b, c, ...,i} – {a, e, i} = {b, c, d, f, g, h}
(iv) (iii) Z′ = U – Z = {a, b, c, ...,i} – {a, g, h} = {b, c, d, e, f, i}
(v) (iv) U′ = U – U = {a, b, c, ...,i} – {a, b, c, ...,i} = { }

4. **If U = {1, 2, 3, ..., 20}, A = {1, 3, 5, ..., 19} and B = {2, 4, 6, ..., 20}, then prove that:**

(i) B′ = A **(ii) A′= B** **(iii) A \ B = ϕ**
(iv) B \ A = ϕ

Solution:

(i) B′ = U – B = {1, 2, 3, ...,20} – {2, 4, 6,...,20} = {1, 3, 5,...,19} = A
(ii) A′ = U – A = {1, 2, 3, ...,20} – {1, 3, 5,...,19}= {2, 4, 6,...,20}= B
(iii) A\ B = A – B = {1, 3, 5,...,19} – {2, 4, 6,...,20} = { }
(iv) B\A = B – A = {2, 4, 6, ...,20} – {1 3, 5,...,19}= { }

5. **If U = set of integers and W = set of whole numbers, then find the complement of set W.**

Solution:

W = {0, 1, 2, 3,...}, U = {0, ± 1, ± 2, ± 3, ...}
W′= U – W = {0, ± 1, ± 2, ± 3,...} – {0, 1, 2, 3, ...}
= {–1, –2, –3,...}

6. If U = set of natural numbers and P = {2, 3, 5, 7, 11, ...} set of w = {1, 2, 3, 4, ...} numbers, then find the complement of set P.

Solution:

U = {1, 2, 3, ...}, P = {2, 3, 5, 7,11,...}

P′ = U − P = {1, 2, 3,...} − {2, 3, 5, 7, 11,...} = {1, 4, 6, 8, 9, 10, 12,...}

SOLVED EXERCISE 1.4

1. If A = {a, e, i, o, u}, B = {a, b, c} and C = {a, c, e, g}, then verify that:

(i) A ∩ B = B ∩ A (ii) A ∪ B = B ∪ A

(iii) B ∪ C = C ∪ B (iv) B ∩ C = C ∩ B

(v) A ∩ C = C ∩ A (vi) A ∪ C = C ∪ A

(i) A ∩ B = B ∩ A

Solution:

A ∩ B = {a, e, i, o, u} ∩ {a, b, c} = {a}

B ∩ A = {a, b, c} ∩ {a, e, i, o, u} = {a}

Thus $A \cap B = B \cap A$

(ii) A ∪ B = B ∪ A

Solution:

A∪B = {a, e, i, o, u} ∪ {a, b, c} = {a, b, c, e, i, o, u}

B∪A = {a, b, c} ∪ {a, e, i, o, u} = {a, b, c, e, i, o, u}

Thus $A \cup B = B \cup A$

(iii) B ∪ C = C ∪ B

Solution:

B ∪ C = {a, b, c} ∪ {a, c, e, g} = {a, b, c, e, g}

C ∪ B = {a, c, e, g} ∪ {a b, c} = {a, b, c, e, g}

Thus B ∪ C = C ∪ B

(iv) B ∩ C = C ∩ B

Solution:

B ∩ C = {a, b, c} ∩ {a, c, e, g} = {a, c}

C ∩ B = {a, c, e, g} ∩ {a, b, c} = {a , c}

Thus B ∩ C = C ∩ B

(v) A ∩ C = C ∩ A

Solution:

A ∩ C = {a, e, i, o, u} ∩ {a, c, e, g} = {a, e}

C ∩ A = {a, c, e, g} ∩ {a, e, i, o, u}= {a, e}

Thus $A \cap C = C \cap A$

(vi) A ∪ C = C ∪ A

Solution:

A ∪ C = {a, e, i, o, u} ∪ {a, c, e, g} = {a, c, e, i, o, g, u}

C ∪ A = {a, c, e, g}∪{a, e, i, o, u} = {a, c, e, i, o, g, u}

Thus $A \cup C = C \cup A$

2. **If $X = \{1, 3, 7\}$, $Y = \{2, 3, 5\}$ and $Z = \{1, 4, 8\}$, then verify that:**

(i) $X \cap (Y \cap Z) = (X \cap Y) \cap Z$

Solution:

$X \cap (Y \cap Z) = \{1, 3, 7\} \cap [\{2, 3, 5\} \cap \{1, 4, 8\}] = \{1, 3, 7\} \cap \{\ \} = \{\}$

$(X \cap Y) \cap Z = [\{1, 3, 7\} \cap [\{2, 3, 5\}] \cap \{1, 4, 8\}] = \{3\} \cap \{1, 4, 8\} = \{\ \}$

Thus $X \cap (Y \cap Z) = (X \cap Y) \cap Z$

(ii) $X \cup (Y \cup Z) = (X \cup Y) \cup Z$

Solution:

$X \cup (Y \cup Z) = \{1, 3, 7\} \cup [\{2, 3, 5\} \cup \{1, 4, 8\}]$

$= \{1, 3, 7\} \cup \{1, 2, 3, 4, 5, 8\} = \{1, 2, 3, 4, 5, 7, 8\}$

$(X \cup Y) \cup Z = [\{1, 3, 7\} \cup \{2, 3, 5\}] \cup \{1, 4, 8\}$

$= \{1, 2, 3, 5, 7\} \cup \{1, 4, 8\} = \{1, 2, 3, 4, 5, 7, 8\}$

Thus $X \cup (Y \cup Z) = (X \cup Y) \cup Z$

3. **If $S = \{-2, -1, 0, 1\}$, $T = (-4, -1, 1, 3\}$ and $U = \{0, \pm 1, \pm 2\}$, then verify that:**

(i) $S \cap (T \cap U) = (S \cap T) \cap U$

Solution:

$S \cap (T \cap U) = \{-2, -1, 0, 1\} \cap [\{-4, -1, 1, 3\} \cap \{0, \pm, 1 \pm 2\}]$

$= \{-2, -1, 0, 1\} \cap \{-1, 1\} = \{-1, 1\}$

$(S \cap T) \cap U = [\{-2, -1, 0, 1\} \cap \{-4, -1, 1, 3\}] \cap \{0, \pm, 1 \pm 2\}$

$= \{-1, 1\} \cap \{0, \pm, 1 \pm 2\} = \{-1, 1\}$

Thus $S \cap (T \cap U) = (S \cap T) \cap U$

(ii) $S \cup (T \cup U) = (S \cup T) \cup U$

Solution:

$S \cup (T \cup U) = \{-2, -1, 0, 1\} \cup [\{-4, -1, 1, 3\} \cup \{0, \pm, 1 \pm 2\}]$

$= \{-2, -1, 0, 1\} \cup \{0, \pm 1, \pm 2, 3, -4\} = \{0, \pm 1, \pm 2, 3, -4\}$

$(S \cup T) \cup U = [\{-2, -1, 0, 1\} \cup \{-4, -1, 1, 3\}] \cup \{0, \pm, 1 \pm 2\}$

$= \{-4, -2, -1, 0, 1, 3\} \cup \{0, \pm, 1 \pm 2\} = \{0, \pm 1, \pm 2, 3, -4\}$

Thus $S \cup (T \cup U) = (S \cup T) \cup U$

4. **If $O = \{1, 3, 5, 7, \ldots\}$, $E = \{2, 4, 6, 8, \ldots\}$ and $N = [1, 2, 3, 4, \ldots]$, then verify that:**

(i) $O \cap (E \cap N) = (O \cap E) \cap N$

Solution:

$O \cap (E \cap N) = \{1, 3, 5, 7, \ldots\} \cap [\{2, 4, 6, 8, \ldots\} \cap \{1, 2, 3, 4, \ldots\}]$

$= \{1, 3, 5, 7, \ldots\} \cap \{2, 4, 6, 8, \ldots\} = \{\ \}$

$(O \cap E) \cap N = [\{1, 3, 5, 7, \ldots\} \cap \{2, 4, 6, 8, \ldots\}] \cap \{1, 2, 3, 4, \ldots\}$

$= \{\ \} \cap \{1, 2, 3, 4, \ldots\} = \{\ \}$

Thus $O \cap (E \cap N) = (O \cap E) \cap N$

(ii) **O ∪ (E ∪ N) = (O ∪ E) ∪ N**

Solution:

O ∪ (E ∪ N) = {1, 3, 5, 7, ...} ∪ [{2, 4, 6, 8,...} ∪{1, 2, 3, 4, ...}]
= {1, 3, 5, 7, ...} ∪ {1, 2, 3,4, ...}={1, 2, 3, 4, ... }

(O ∪ E) ∪ N = [{1, 3, 5, 7, ...} ∪ {2, 4, 6,...}] ∪{1, 2, 3, 4, ...}
= {1, 2, 3, 4, ...} ∪ {1, 2, 3, 4, ...} = {1, 2, 3, 4, ...}

Thus $O \cup (E \cup N) = (O \cup E) \cup N$

5. **If U = {a, b, c,..., z], S = {a, e, i, o, u] and T ={x, y, z}, then verify that:**

(i) **S ∪ ϕ = S**

Solution:

S ∪ ϕ = {a, e, i, o, u} ∪ ϕ = {a, e, i, o, u} = S

(ii) **T ∩ U = T**

Solution:

T ∩ U = {x, y, z} ∩ {a, b, c, ...,z} = {x, y, z} = T

(iii) **S ∩ S' = ϕ**

Solution:

S = {a, e, i, o, u}

S' = U – S = {a, b, c, ...,z} – {a, e, i, o, u} = {b, c, d, f, g, h, j....,n, p,..., t, v,..., z}

S ∩ S' = {a, e, i, o, u} ∩ {b, c, d, f, g, h, j....,n, p,..., t, v,..., z} = ϕ

(iv) **T ∪ T' = U**

Solution:

T = {x, y, z}

T' = U – T = {a, b, c, ...,z} – {x, y, z} = {a, b, c, ...,w}

T∪T' = {x, y, z}∪ {a, b, c, ...,w} = {a, b, c, ...,z} = U

6. **If A = {l, 7, 9, 11}, B = {1, 5, 9, 13} and C = {2, 6, 9, 11}, then verify that:**

(i) **A – B ≠ B – A**

Solution:

A – B = {1, 7, 9, 11} – {1, 5, 9, 13} = {7, 11}

B – A = {1, 5, 9, 13} – {1, 7, 9, 11} = {5, 13}

Hence, A – B ≠ B – A

(ii) **A – C ≠ C – A**

Solution:

A – C = {1, 7, 9, 11} – {2, 6, 9, 11} = {1, 7}

C – A = {2, 6, 9, 11} – {1, 7, 9, 11} = {2, 6}

Hence, A – C ≠ C – A

7. If U = {0, 1, 2,...,15}, L= {5,7,9,...,15} and M = {6,8, 10, 12, 14}, then verify the clear it with respect to union and intersection of sets.

Solution:

U = {0, 1, 2,...,15}, L= {5,7,9,...,15}, M = {6,8, 10, 12, 14}

Properties of union:

(i) $U \cup L = U$

L.H.S = $U \cup L$

= {0, 1, 2, ...,15} ∪ {5, 7, 9, ...,15}= {0, 1, 2, ...,15} = U = R.H.S

(ii) $U \cup M = U$

L.H.S = $U \cup M$

= {0, 1, 2, ...,15} ∪ {6, 8, 10, 12, 14}= {0, 1, 2, ...,15} = U = R.H.S

Properties of Intersection:

(i) $U \cap L = L$

L.H.S = $U \cap L$

= {0, 1, 2, ...,15} ∩ {5, 7, 9, ...,15} = {5, 7, 9, ...,15} = L = R.H.S

(ii) $U \cap M = M$

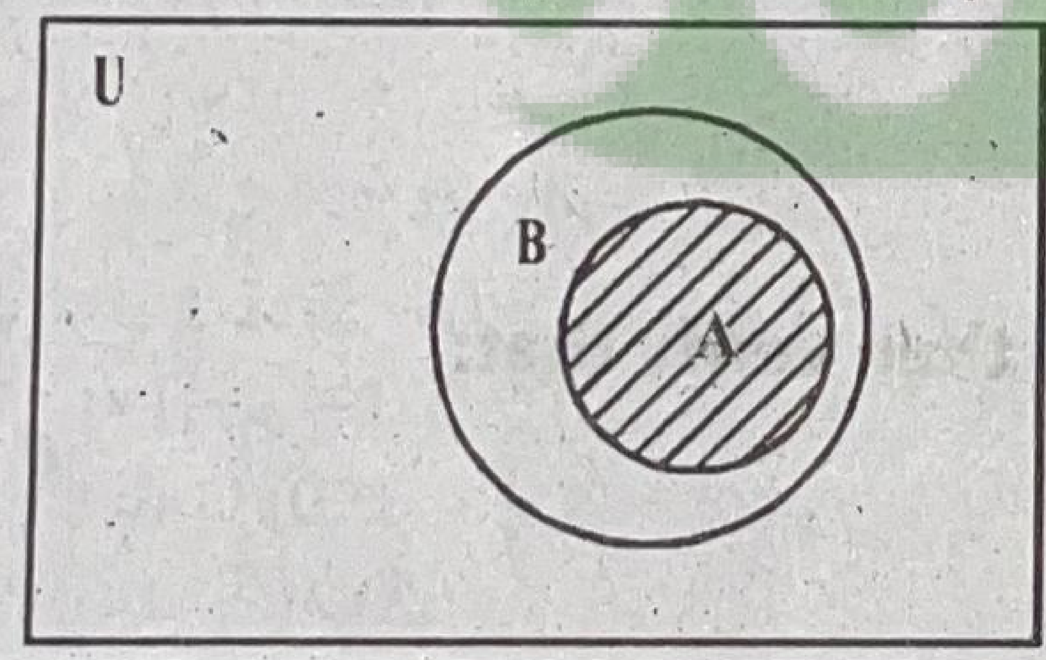
L.H.S = $U \cap M$

= {0, 1, 2, ...,15} ∩ {6, 8, 10, 12, 14}= {6, 8, 10, 12, 14} = M = R.H.S

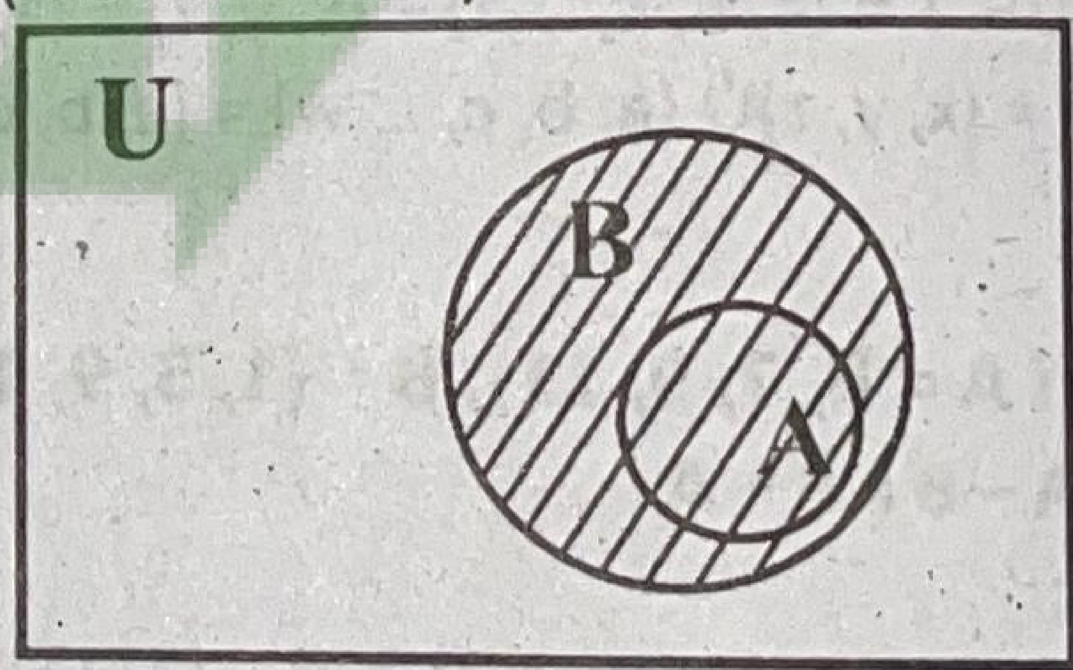
SOLVED EXERCISE 1.5

1. **Shade the diagrams according to the given operations.**

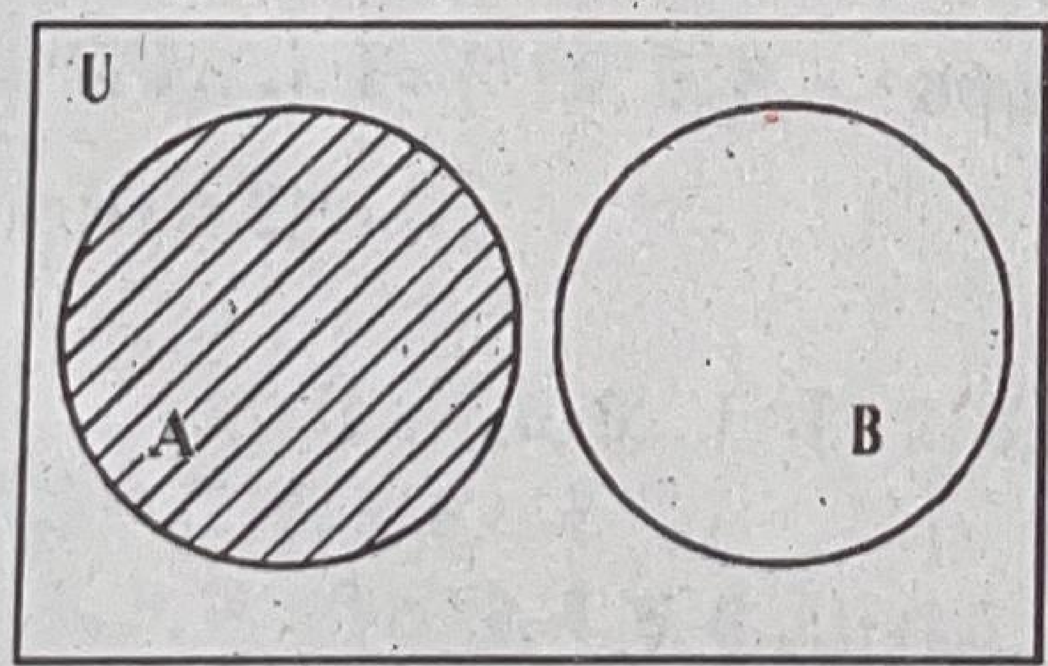
(i) A ∩B (A is subset of B)



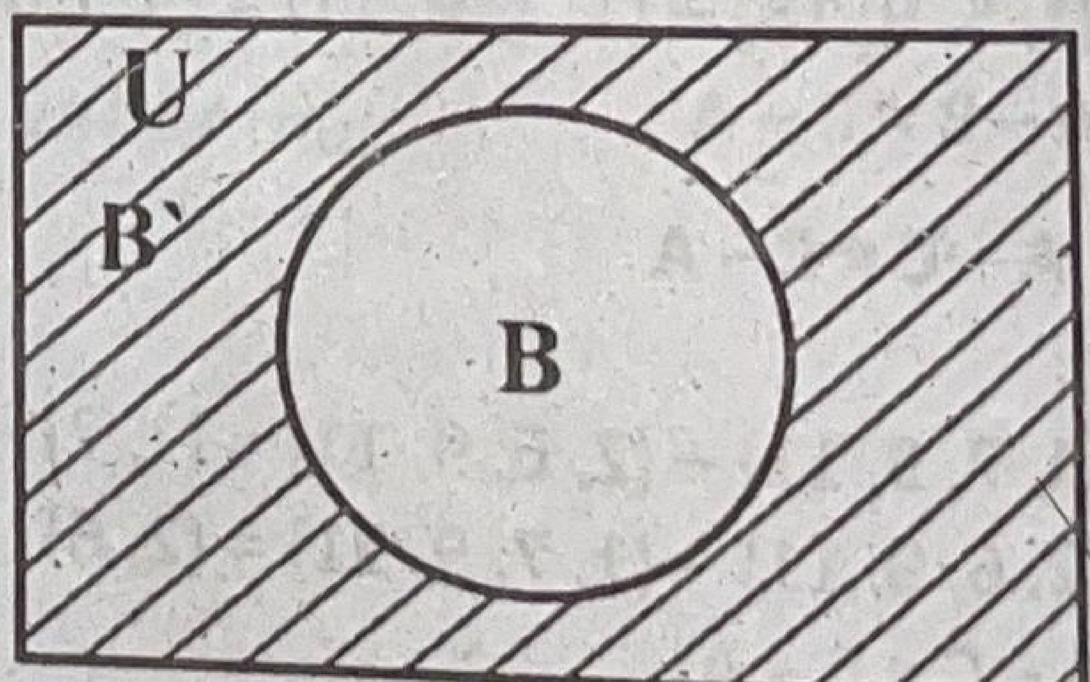
(ii) A ∪B (A is subset of B)



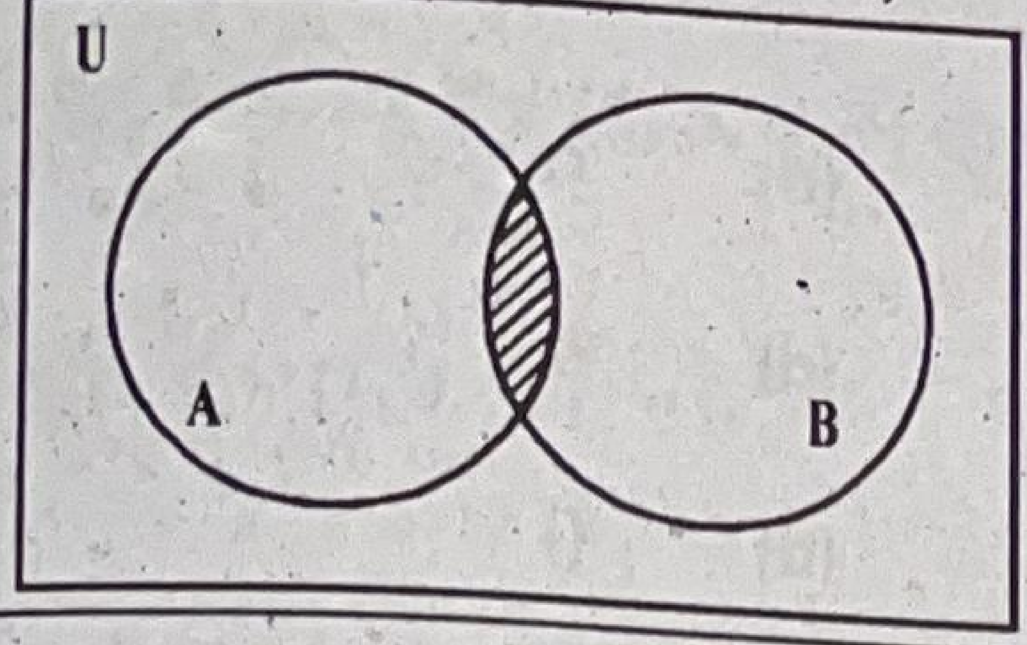
(iii) A –B (For disjoint sets)



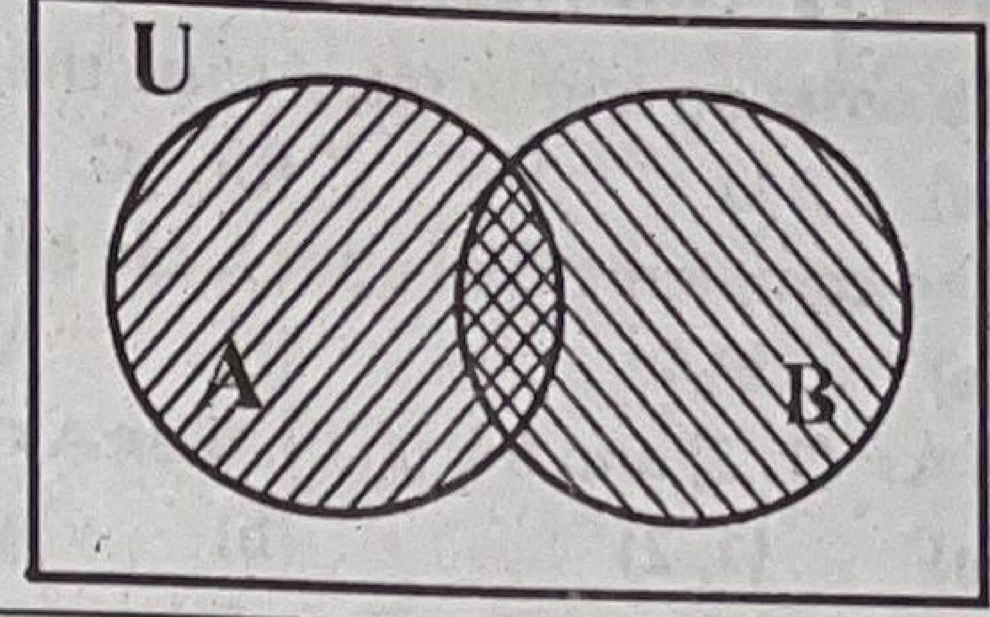
(iv) B'



(v) A∩B (Overlapping sets)



(vi) AUB if AUB ≠ U



SOLVED REVIEW EXERCISE 1

1. Answer the following questions.

(i) Name the forms for describing a set.

Answer:

1. Descriptive form 2. Tabular form 3. Set builder form

(ii) Define the descriptive form of a set.

Answer:

If a set is described with the help of a statement, it is called descriptive form.

(iii) What does the symbol " | " mean?

Answer:

Such that

(iv) Write the name of the set consisting of all the elements of given sets under consideration.

Answer:

Universal set

(v) What is meant by disjoint sets?

Answer:

Two sets are said to be disjoint, if there is no common element between them.

2. Fill in the blanks.

(i) The symbol "∧" means ______.

(ii) The set consisting of only common elements of two sets is called the ________ of two sets.

(iii) A set which contains all the possible elements of the sets under consideration is called the ______ set.

(iv) Two sets are called ________ if there is at least one element common between them.

(v) In sets, the universal set acts as ______ for intersection.

Answers:

(i)	And	(ii)	Intersection	(iii)	Universal
(iv)	Overlapping	(v)	Identity		

3. Tick (✓) the correct answer.

(i) To write an empty set, we use the symbol:
(a) U (b) ⊆ (c) ϕ (d) ∩

(ii) The complement of a set A can be written as:
(a) B\A (b) A' (c) ∩ (A) (d) A

(iii) If A = {1, 2} and B = {a, b}, then A ∩ B = ______.
(a) {1, 2} (b) {a, b} (c) {1, 2, a, b} (d) {}

(iv) If, A = {1, 3} and B = {1, 2, 3}, then AUB = ______.
(a) {1, 2, 3} (b) {1} (c) { } (d) {1, 3}

(v) "B difference A" is represented by:
(a) A – B (b) A ∩ B (c) B\A (d) AUB

(vi) A' U A = ______.
(a) U (b) ϕ (c) A (d) A'

Answers:

(i)	c	(ii)	b	(iii)	d	(iv)	a	(v)	c	(vi)	a

4. Write the following sets in the set builder form and tabular form.

Answers:

(i) {x|x ∈N ∧ 4 < x < 9} {5, 6, 7, 8}
(ii) {x|x ∈W ∧ x < 3} {0, 1, 2}
(iii) {x|x is a vowel of the English alphabet} {a, e, i, o, u}
(iv) {x|x ∈N ∧ x < 100} { 1, 2, 3, 4, 5, 6 ,... ,99}
(v) {x|x ∈O ∧ 1 < x < 10} {3, 5, 7, 9}

5. Write the following in the descriptive and tabular form.

Answers:

(i) **A is the set of whole numbers less than 7**
A = {0, 1, 2, 3, 4, 5, 6}

(ii) **B is the set of even numbers greater than 3 and less than 12**
B = {4, 6, 8, 10}

(iii) **C is the set of integers greater than □2 and less than 2.**
C = {–1, 0, 1}

(iv) **D is the set of prime numbers less than 15**
D = {2, 3, 5, 7, 11, 13}

6. If A = {3, 4, 5, 6} and B = {2, 4, 6} then verify that

(i) AUB = BUA

Solution:

AUB = {3, 4, 5, 6,} U {2, 4, 6} = {2, 3, 4, 5, 6}
BUA = {2, 4, 6} U {3, 4, 5, 6} = {2, 3, 4, 5, 6}

(ii) A∩B = B∩A

Solution:

A∩B = {3, 4, 5, 6,} ∩ {2, 4, 6} = {4, 6}

$B \cap A = \{2, 4, 6\} \cap \{3, 4, 5, 6\} = \{4, 6\}$

7. If $X = \{2, 3, 4, 5\}$, $Y = \{1, 3, 5, 7\}$ then find

(i) $X - Y$

Solution:

$X - Y = \{2, 3, 4, 5\} - \{1, 3, 5, 7\} = \{2, 4\}$

(ii) $Y - X$

Solution:

$Y - X = \{1, 3, 5, 7\} - \{2, 3, 4, 5\} = \{1, 7\}$

8. If $A = \{a, c, e, g\}$, $B = \{a, b, c, d\}$ and $C = \{b, d, f, h\}$, then verify that:

(i) $A \cup (B \cup C) = (A \cup B) \cup C$

Solution:

L.H.S $= A \cup (B \cup C)$

$= \{a, c, e, g\} \cup [\{a, b, c, d\} \cup \{b, d, f, h\}]$

$= \{a, c, e, g\} \cup \{a, b, c, d, f, h\} = \{a, b, c, d, e, f, g, h\}$

R.H.S $= (A \cup B) \cup C$

$= [\{a, c, e, g\} \cup \{a, b, c, d\}] \cup \{b, d, f, h\}]$

$= \{a, b, c, d, e, g\} \cup \{b, d, f, h\} = \{a, b, c, d, e, f, g, h\}$

As L.H.S = R.H.S

Hence Proved

(ii) $A \cap (B \cap C) = (A \cap B) \cap C$

Solution:

L.H.S $= A \cap (B \cap C)$

$= \{a, c, e, g\} \cap [\{a, b, c, d\} \cap \{b, d, f, h\}]$

$= \{a, c, e, g\} \cap \{b, d\} = \{\ \}$

R.H.S $= (A \cap B) \cap C$

$= [\{a, c, e, g\} \cap [\{a, b, c, d\}] \cap \{b, d, f, h\}]$

$= \{a, c\} \cap \{b, d, f, b\} = \{\ \}$

As L.H.S = R.H.S

Hence Proved

9. If U = set of whole numbers and N = set of natural numbers, then verify that:

(i) $N' \cup N = U$ **(ii) $N' \cap N = \phi$**

Solution:

$U = \{0, 1, 2, 3, \ldots\}$, $N = \{1, 2, 3, \ldots\}$

N′ = U – N
= {0, 1, 2, 3, ...} – {1, 2, 3, ...} = {0}

(i) **L.H.S = N′U N**
= {0}U {1, 2, 3,...} = {0, 1, 2, 3, ...} = U =R.H.S

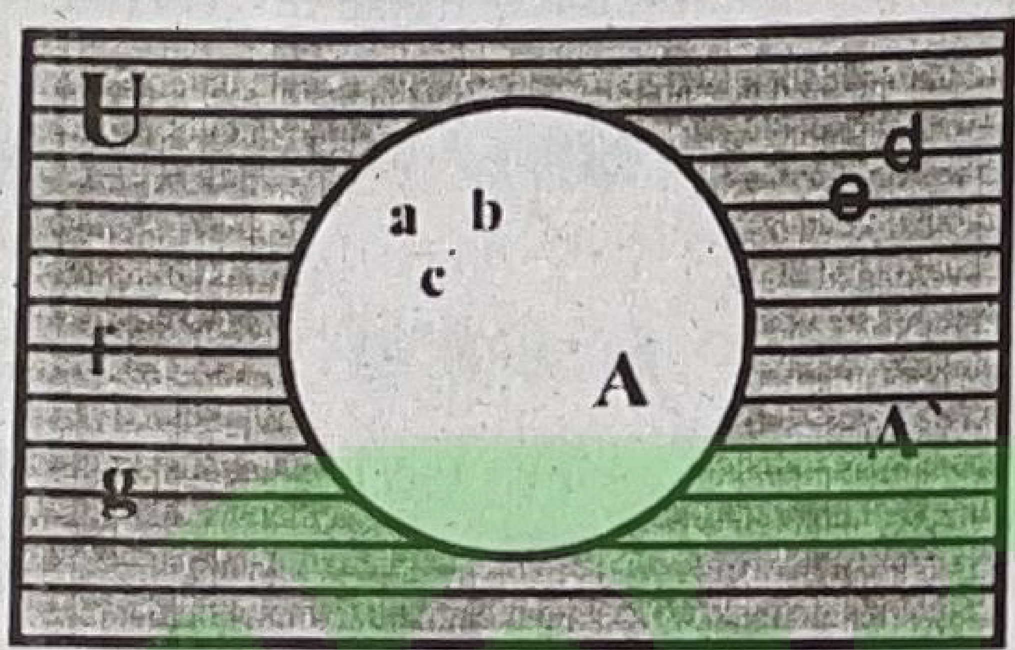
(ii) **L.H.S = N′ ∩ N**
= {0} ∩ {1, 2, 3,...} = ϕ = R.H.S

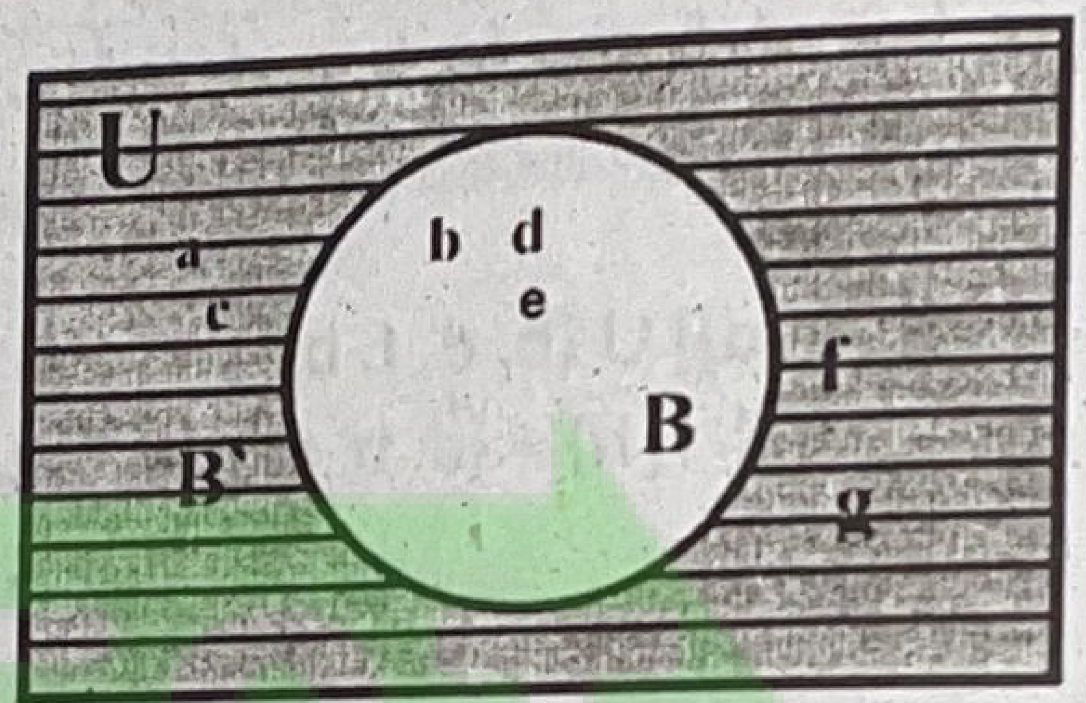
10. If U = {a, b, c, d, e, f, g}, A = {a, b, c} and B = {b, d, e}, then show through Venn diagram.

(i) **A′** **(ii)** **B′** **(iii)** **AUB** **(iv)** **A∩B**

Solution:

(i) A′ = {d, e, f, g} **(ii)** B' = {a, c, f, g}





(iii) A ∪ B = {a, b, c, d, e} **(iv)** A∩B = {b}