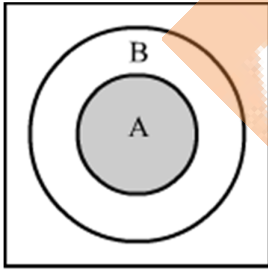**Exercise: 1.5**

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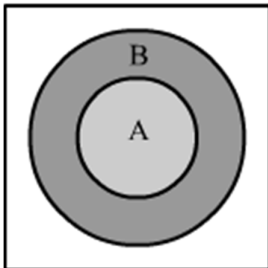
Question 1:

Solution:

From the Venn diagrams given below, we can clearly say that if A and B are two sets such that $A \subset B$ then

(i) Form the given Venn diagram, we can see that $A \cap B = A$

(ii) Form the given Venn diagram, we can see that $A \cup B = B$

Question 2

Solution:

Given:
$A = \{1,2,3,4,5\}, B = \{4,5,6,7,8\}, C = \{7,8,9,10,11\}$ and $D = \{10,11,12,13,14\}$

(i) $A \cup B = \{1,2,3,4,5,6,7,8\}$

(ii) $A \cup C = \{1,2,3,4,5,7,8,9,10,11\}$

(iii) $B \cup C = \{4,5,6,7,8,9,10,11\}$

(iv) $B \cup D = \{4,5,6,7,8,10,11,12,13,14\}$

(v) $A \cup B \cup C = \{1,2,3,4,5,6,7,8,9,10,11\}$

(vi) $A \cup B \cup D = \{1,2,3,4,5,6,7,8,10,11,12,13,14\}$

(vii) $B \cup C \cup D = \{4,5,6,7,8,9,10,11,12,13,14\}$

(viii) $A \cap B \cup C = \{4,5\}$

(ix) $A \cap B \cap B \cap C = \phi$

(x) $A \cup D \cap B \cup C = \{4,5,10,11\}$

Question 3

Solution:

A=x:x∈N={1,2,3,…}B=x:x-2n, n∈N={2,4,6,8,…} C=x:x=2n-1, n∈N={1,3,5,7,…}
D = {x:x is a prime natural number.} = {2, 3, 5, 7,…}
(i) A∩B = B
(ii) A∩C = C
(iii) A∩D = D
(iv) B∩C = ϕ
(v) B∩D = {2}
(vi) C∩D = D-{2}

Question 4

Solution:

Given:
A = {3, 6, 12, 15, 18, 21}, B = {4, 8, 12, 16, 20}, C = {2, 4, 6, 8, 10, 12, 14, 16} and D = {5, 10, 15, 20}
(i) A-B = {3, 6, 15, 18, 21}
(ii) A-C = {3, 15, 18, 21}

(iii) A-D = {3, 6, 12, 18, 21}
(iv) B-A = {4, 8, 16, 20}
(v) C-A = {2, 4, 8, 10, 14, 16}
(vi) D-A = {5, 10, 20}
(vii) B-C = {20}
(viii) B-D = {4, 8, 12, 16}

Question 5

Solution:

Given:
U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {1, 2, 3, 4}, B= {2, 4, 6, 8} and C = {3, 4, 5, 6}
(i) A' = {5, 6, 7, 8, 9}
(ii) B' = {1, 3, 5, 7, 9}
(iii) A∩C' = {1, 2, 5, 6, 7, 8, 9}
(iv) A∪B' = {5, 7, 9}

(v) A" = {1, 2, 3, 4} = A
(vi) B-C' = {1, 3, 4, 5, 6, 7, 9}

Question 6

Solution:

Given:
U = {1, 2, 3, 4, 5, 6, 7, 8, 9}, A = {2, 4, 6, 8} and B = {2, 3, 5, 7}
We have to verify:

(i) A∪B'=A'∩B'
LHS
A∪B ={2,3,4,5,6,7,8}A∪B '={1,9}

RHS
A'={1,3,5,7,9}B'={1,4,6,8,9}A'∩B'={1,9}

LHS = RHS
Hence proved.

(ii) A∩B'=A'∪B'

LHS
A∩B={2}A∩B'={1,3,4,5,6,7,8,9}

RHS
A'={1,3,5,7,9}B'={1,4,6,8,9}A'∪B'={1,3,4,5,6,7,8,9}

LHS = RHS
Hence proved.