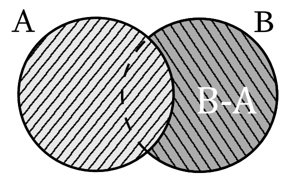
Examining the accompanying Venn diagram one immediately gets the relationships



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

which when added member to member give

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

0.1. Complement. When $A \subseteq S$, the difference $S - A$ is called the *complement* of A with respect to (w.r.t. to) the set S, and denoted by

$$\complement_S A \qquad \text{(Read: The complement of } A \text{ w.r.t. to } S\text{)}$$

If S is taken as a universal set U, the notation for the complement of A is simply A'. The immediate corollaries are clear:

$$(A')' = A, \qquad U' = \emptyset, \qquad \emptyset' = U$$

EXAMPLE 0.1. For $S = \{2, 4, 5, 6, 9\}$ and $A = \{2, 6, 9\} \subseteq S$ find the complement of A w.r. to S.

$$\complement_S A = S - A = \{4, 5\}$$

EXAMPLE 0.2. $\complement_R \mathbb{Q} = \mathbb{Q}'$

EXAMPLE 0.3. Verify the following relations by the use of Venn diagrams