SETS - Intersection, Union, Compliment, and Set Difference

The **intersection** of sets A and B is the set of elements that are in both set A and set B.
We write the intersection as $A \cap B$
Example: Let $A = \{c, a, r, o, l, i, n\}$ and $B = \{f, l, o, r, i, d, a\}$ then $A \cap B = \{a, r, o, l, i\}$

If the sets have no elements in common, they are **disjoint sets**.

The **union** of sets A and B is the set of elements that are in either A or B, or both.
We write the union as $A \cup B$
Example: Let $A = \{c, a, r, o, l, i, n\}$ and $B = \{f, l, o, r, i, d, a\}$
then $A \cup B = \{c, a, r, o, l, i, n, f, d\}$
Notice that we did not write the shared elements: a, r, o, l, i twice in the union set.

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The number of elements in the union of set A and set B is the sum of the number of elements in both sets minus the number of elements in their intersection: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
Example:
$A = \{d, o, g\}$ and $n(A) = 3$
$B = \{s, l, e, d\}$ and $n(B) = 4$
$A \cap B = \{d\}$ and $n(A \cap B) = 1$
$A \cup B = \{d, o, g, s, l, e\}$ and $n(A \cup B) = 6 = 3 + 4 - 1 = n(A) + n(B) - n(A \cap B)$

The **complement** of A is the set of elements of the universal set, U, that are not elements of A.
Example: $U = \{t, e, x, a, s\}$ and $A = \{e, a\}$ and the complement of $A = \{t, x, s\}$

The **difference** of sets B and A is the set of elements that are in B but not in A.
Example: $A = \{2, 4, 6, 8\}$ and $B = \{1, 2, 3, 4, 5, 6\}$
$B - A = \{1, 3, 5\}$