Name: _____

MA162-020
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Quiz 6.1: Sets and set operations

1. You are without a car, but in need of a car next week. Your pal Adam is too busy studying and training to go out, and so he can loan you his car Tuesday, Wednesday, and Thursday. Your pal Bianca is crazy busy at the beginning of the week, but has plans the rest, so she can loan you her car Monday, Tuesday, and Wednesday.

Adam will loan you his car those 3 days, and Bianca will loan your her car those 3 days, how many days do you have covered?

2. If $A = \{T, W, R\}$ and $B = \{M, T, W\}$, what are $A \cup B$, $A \cap B$, $A - B$, and $B - A$?

3. If $A = \{1, 2, 3\}$ and $B = \{4, 5, 6\}$, then what is $A \cap B$?

4. Suppose a drug-test always detects users, but 5% of the time, reports non-users as users. If 10 people are reported as users by the drug-test, then how many of them are actually users?

Vocabulary:

- Elements – fancy word for "thing in a set"
- Set – fancy word for "a collection of elements"
- Set equality – two sets are equal if they contain exactly the same elements
- Subset – $A \subseteq B$ means every element of A is also an element of B
- Empty set – the set that does not contain anything (the smallest set)
- Union – $A \cup B$ is the set containing every element in A, as well as every element in B
- Intersection – $A \cap B$ is the set containing the elements in A that are also in B
- Complement – $A - B$ is the set containing the elements in A that are not in B

Examples:

- If $A = \{1, 2, 3, 4, 5, 6, 7\}$ and $B = \{5, 6, 7, 8, 9, 10\}$ then:
  - $A \cup B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
  - $A \cap B = \{5, 6, 7\}$
  - $A - B = \{1, 2, 3, 4\}$
  - $B - A = \{8, 9, 10\}$
  - A is not equal to B
  - A is not a subset of B
  - B is not a subset of A
- If $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 4, 5\}$ then:
  - $A \cup B = \{1, 2, 3, 4, 5\}$
  - $A \cap B = \{3, 4, 5\}$
  - $A - B = \{1, 2\}$
  - $B - A = \{\}$ is empty
  - A is not equal to B
  - A is not a subset of B
  - B is a subset of A
- If $A = \{1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 3, 4\}$ and $B = \{1, 2, 3, 4\}$ then:
  - $A \cup B = \{1, 2, 3, 4\}$
  - $A \cap B = \{1, 2, 3, 4\}$
  - $A - B = \{\}$
  - $B - A = \{\}$
  - A is equal to B
  - A is a subset of B
  - B is a subset of A
- If $A = \{x : x$ is a positive integer whose square is a one digit number $\}$ then $A = \{1, 2, 3\}$