

Basic Set concepts

- A "set" is a collection of objects. Each object is called an "element" of the set.
- Often the objects/elements in a set are enclosed in "braces."

- Example:

- The set of integers between 1 and 5 can be written as: $\{1, 2, 3, 4, 5\}$

The Empty/Null Set

- The **empty set** is also called the **null set**. It's a set that contains NO elements.

$\{ \}$ or \emptyset

- The empty set is represented by :

Elements of a Set

- The symbol " \in " shows an object is an element of a set. It's used to replace the words "is an element of."

- The symbol " \notin " shows an object is "not an element of" a set.

- Example: $3 \in A$ $3 \notin A$

Universal Set

- A "universal set" is one that contains all of the elements that are included in the discussion.

- Symbol: $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$U = \{ \text{all even integers} \}$

Complement of a Set

- The "complement" of a set is the collection of all the objects in the universal set that are not in a given set.

- Symbol:

$$U = \{2, 4, 6, 8, 10\}$$

$$A' = \{6, 8, 10\}$$

$$A = \{2, 4\}$$

$$\bar{A} = \{6, 8, 10\}$$

- (think of it as NOT A or everything except for set A)

Subset of a Set

• A subset is part of a set. EVERY element in a subset can be found in the set.

• Set A is a subset of set B is expressed as: $A \subseteq B$ if every element in set A is also in set B

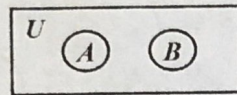
• Example:
 $A = \{1, 3, 5, 7, 9\}$
 $B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

Ex: List all subsets of set A = {1, 2, 3}

{1} {2} {3} {1, 2} {1, 3} {2, 3} {1, 2, 3} {}

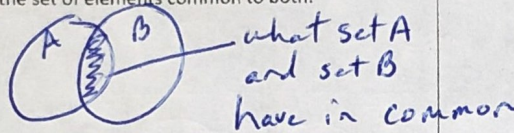
Venn Diagrams

Disjoint sets have no elements in common.



Intersection of sets is the set of elements common to both.

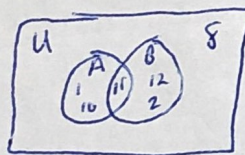
Example:



Intersection of Sets

• The intersection of sets A and B, written as $A \cap B$ ^{"and"}, is the set of elements **common** to both set A and B

• Example:



$$A \cap B = \{11\}$$

Union of Sets

• The **union** of sets A and B, written as $A \cup B$ ^{"or"}, is the set of elements that are members of set A **OR** set B **OR** of both sets.

• Example: $A \cup B = \{1, 2, 10, 11, 12\}$

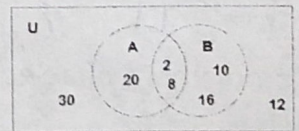
• **you only right the element once.

Example

$U = \{1-10; \text{natural numbers only}\} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
 $A = \{1, 4, 5, 6, 7\}$
 $B = \{1, 2, 3, 8, 9\}$
 $C = \{2, 9\}$

Example

Use the Venn Diagram:



1) Find $A \cup B$

$\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

3) Find $A \cap C$

$\{ \}$ or \emptyset

5) Find $B - A$

$\{2, 3, 8, 9\}$

2) Find C'

$\{1, 3, 4, 5, 6, 7, 8, 10\}$

4) True/False $C \subseteq A$

False

6) Find $A - B$

$\{4, 5, 6, 7\}$

7) What is $A \cup B$?

$\{2, 8, 10, 16, 20\}$

9) What is $A \cap B$?

$\{2, 8\}$

11) If $C = \{\text{even #'s}\}$, then is $A \subseteq C$?

yes $\{2, 20, 30\}$

12) If $D = \{\text{odd #'s}\}$, what is $B \cap D$?

\emptyset or $\{ \}$

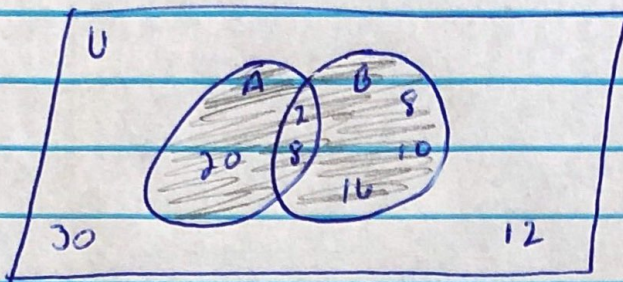
8) What is A' ?

$\{10, 12, 16, 30\}$

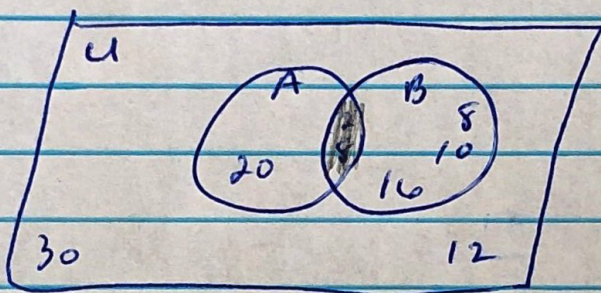
10) What is B' ?

4/8/19 Notes

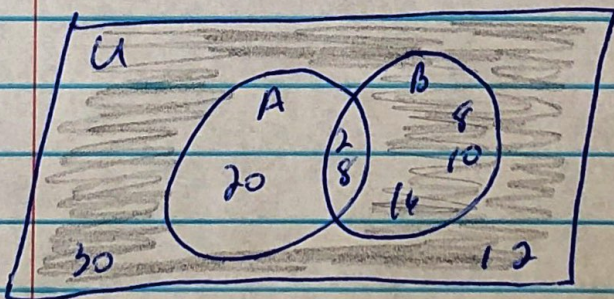
Use the Venn Diagram:



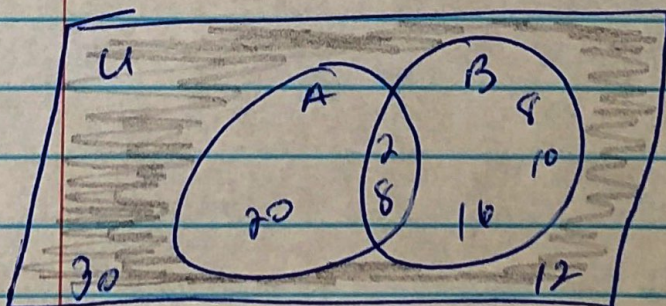
(13) What section would you shade to show $A \cup B$?



(14) $A \cap B$



(15) A'



(16) $(A \cup B)'$